Taxonomic Revision of Astragalus L. sect. Hymenostegis Bunge (Leguminosae)

S. ZARRE M. & D. PODLECH

Abstract:
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The present work comprises the revision of *Astragalus* L. sect. *Hymenostegis* Bunge. 22 species are recognized. Detailed descriptions, complete lists of synonyms and distribution maps are given for all taxa. One species and one subspecies are newly described. The sect. *Hymenocoleus* Bunge is reduced to the rank of subsection. Differences between the section and the closely related sections are discussed.

Zusammenfassung:
Eine Revision von *Astragalus* L. sect. *Hymenostegis* wird vorgelegt. Ausführliche Beschreibungen, vollständige Synonymie und Verbreitungskarten aller Sippen werden angegeben, eine Art und eine Unterart neu beschrieben. Die Sektion *Hymenocoleus* wird als Subsektion von *Hymenostegis* geführt, die Unterschiede zu verwandten Sektionen diskutiert.

Introduction

Astragalus sect. *Hymenostegis* was placed by BUNGE (1868/69) in the artificial subgen. *Calycophysa*, together with its closest relatives, i.e. sect. *Megalocystis* Bunge, which was reviewed recently, see TIETZ & ZARRE (1994) and sect. *Acidodes* Bunge, for which no modern revision is available.

The entire section was revised by RECHINGER et al. (1958) and later for certain areas e.g. the flora of Turkey (CHAMBERLAIN & MATTHEWS 1970), the flora of URSS (GONTSCHAROV 1946) and flora of Iraq (TOWNSEND & GUEST 1974). However, because of the great variability in many species of the section, none of the available keys are useful for naming the species. The extensive variability present caused the taxonomists to describe a lot of new species in this relatively small section. The goal of this work was to provide an exact taxonomic definition for each taxon in the section, to recognize the limits of morphological diversity for each taxon and to prepare an useful diagnostic key for all taxa.

The present work is mainly based on the study of herbarium material kindly provided by the following herbaria (abbreviated according HOLMGREN et al. 1990): B, BG, BRNM, C, E, G, G-BOIS, JE, K, L, M, MSB, P, PR, TARI, TUH, W, WU and ZT.

Some additional field studies were carried out during an excursion to Iran (by S. ZARRE).

We want to thank the directors of the above mentioned herbaria for sending the material. We are grateful to Mr. CHEHREGANI from Bou-Ali University of Hamadan (Iran) for his support, especially in organizing the excursion in Iran. This work is partly supported by the Ministry of Culture and Higher Education of Islamic Republic Iran.

Position of the sect. *Hymenostegis* within the genus

Within the subgen. *Astragalus* sect. *Hymenostegis* belongs to the group of thorny Astragali (with exception of *A. vaginans*, whose leaves are imparipinnate) with a calyx inflated in fruit and unilocular fruits, which remain enclosed by the calyx up to maturity. The most conspicuous characters of the section are the ± large bracts and panduriform standards. Since some species of the closely related and very heterogeneous sect. *Megalocystis* have similarly ± large bracts and panduriform standard, there are some difficulties in separating the sections. However, the flowers in sect. *Megalocystis* are pedicellate in opposite to sect. *Hymenostegis* with sessile flowers. Moreover most of the species with such a standard in the former section have black hairs beside the white ones on the calyx, but in sect. *Hymenostegis* black hairs are always absent. For an exact view on the limits between these two sections see the diagnostic key.

Diagnostic key to the closely related sections

1 Short lateral shoots usually present at the base of each leaf on the main stem; inflorescences born on the short lateral shoots, only in *A. pachyrhachis* short lateral shoots sometimes not clearly developed sect. ***Poterion***

– Short lateral shoots absent; inflorescences arising from the main stem 2

2 Standard at least 15 mm long, if shorter, then the limb hastate or auriculate at base 3

– Standard up to 13(–14) mm long, limb rounded or somewhat angulately passing into the claw 5

3 Limb of standard rounded at the base sect. ***Megalocystis***

– Limb of standard hastate-auriculate at base 4

4 Flowers pedicellate; black hairs on inflorescence present, if absent (in *A. ebenoides* and *A. szovitsii*), then fruit laterally compressed and two bracteoles on the base of each calyx present sect. ***Megalocystis***

– Flowers sessile; black hairs absent; fruit dorsi-ventrally compressed; bracteoles absent or rarely present at the base of some calyces and mostly not in pairs sect. ***Hymenostegis***

5 Fruiting calyx only slightly larger than flowering one, ± campanulate to globose, not rupturing, 3–4,5 mm wide, the tube 3–5 mm long, only in *A. argyrostachyus* clearly enlarging, 6–9 mm wide, campanulate; calyx teeth as long as tube to distinctly longer than it; longer hairs on the calyx 2–4 mm sect. ***Campylanthus***

– Fruiting calyx bladdery inflated, contracted at the teeth, only in *A. diopogon* rarely rupturing, (4)5–10 mm wide, the tube 5–15 mm long; calyx teeth distinctly shorter than the tube; calyx hairs up to 2 mm long 6

6 Inflorescence longer than the leaves, if shorter, then densely flowered; fruit laterally compressed sect. ***Microphysa***

– Inflorescence shorter than or as long as the leaves, remotely few-flowered (with 2–6, rarely up to 13 flowers); fruit dorsi-ventrally compressed
sect. ***Megalocystis*** (*A. diopogon* and *A. eriostomus*)

Valuation of taxonomic characters

Many characters, which are normally important for the delimitation of neighboring sections, are not significant in sect. *Hymenostegis*, either because of homogeneity of the section, or because they are influenced strongly by ecological conditions. Relatively short flowering and fruiting period is another problem in naming the species. Our key is primarily useful when the flowers are still adherent to the inflorescence. Importance, variability and applicability of the characters are subsequently discussed:

Life forms, branching mode and habit: Except for *A. vaginans*, all species of the section are thorny cushions-forming subshrubs of alpine habitats. All are arising from a woody underground caudex. The stems are mostly branched from the base. In response to different ecological conditions the branching pattern can vary from remote to dense, even in the same species. Therefore none of these characters are of taxonomical importance.
Indument: The hairs are basifix (stable character of the subgen. *Astragalus*) and mostly pure white. *A. recognitus* and *A. hymenocystis* subsp. *hymenocystis* are the only taxa of the section with brownish-yellow hairs. Length of the hairs (especially on the calyx), their density and form are often very important characters.
Stem: Only *A. vaginans* has a stem with relatively long internodes, which is almost glabrous. Other species have stems with long internodes, which are hairy but become glabrescent later on.
Stipules: They have mostly the same texture as the bracts and can be useful for separating the species. Stipules are in many species long adnate to the petioles and otherwise connate. They become mostly glabrescent. The shape shows little variability and is therefore of no taxonomic value. The size of the stipules is very important and makes some species easily separable. In some species such as *A. chrysostachys* venation of the stipules shows only one main nerve at free portion, but the number of the nerves may increase under different ecological conditions. Because of this variability in some species, the stipule venation is of no taxonomic importance.
Leaves: As mentioned above with the exception of *A. vaginans* all species of the section possess paripinnate leaves. In some species the length of the leaves is very variable, but in some cases it can be used as a distinctive character. This is also true for the orientation of the rachides: In some species such as *A. persicus* both forms of rachides, straight and recurved, can be seen. The relative length petiole to the whole rachid is more or less equal in all of the species. End-thorn in subsect. *Hymenostegis* is mostly shorter than the uppermost leaflets, with some exceptions in *A. hirticalyx*. The number of leaflet-pairs is not very variable, and is of no taxonomical importance. *A. laguriformis* with 1–4 pairs of leaflets is the only species which can be characterized by this feature. Leaflet size, shape and indumentum are sometimes very good characters.
Inflorescence: Although some species show variability, the relative size of the inflorescence to the leaves is mostly of taxonomic significance. Its size and shape is important too. But in some withered specimens it is not easy to recognize, because the flowers fall off quickly. In this case the distance between flower traces can be used to determine whether the inflorescence is lax, which is very important for distinguishing some closely related species (for example *A. uraniolimneus* from *A. lagopodioides*).

The indumentum on peduncles is another important character. It can be villose or composed of straight, ± appressed hairs.
Bracts: Texture, size, tip, indumentum and colour of the bracts are the most decisive characters in the section. Very thin and hyaline bracts characterize for example *A. chrysostachys*. Acutely tipped bracts of *A. kohrudicus* make it easily distinguishable from the related *A. glumaceus*. The bracts in most of the species are glabrous inside, but in some others such as *A. hymenostegis, A. lagopoides, A. persicus* (not always) and *A. tabrizianus* they are hairy inside, especially at tip. Moreover the venation of the bracts of *A. hymenostegis* differs in one aspect from that of other species: The ends of the nerves are connected reticulately instead of ending parallely. However, this charachter is not easy to observe.
Bracteoles: They are rarely developed in some species and of no taxonomic importance.
Pedicel: All the species have nearly sessile flowers.
Calyx: In spite of its very thin texture the calyx remains unruptured during its maturation in all species. With exceptions of *A. paralurges* and *A. sciureus* the calyx is bladdery inflated immediately after anthesis. The shape of calyx is at first tubular and after inflation globose or elliptic. Calyx is parallely nerved, and the number of the nerves changes in a narrow range. The calyx indumentum and form of the teeth are almost constant in all species. However the size of the calyx, colour of the nerves and proportion of the tooth length to the tube are sometimes distinguishing characters.
Corolla: Almost all species have standards with yellowish white claws. But the limb colour is a good character to distinguish for example *A. chrysostachys* and *A. recognitus* from other closely related species. They have always yellowish white limbs, whereas other species may have pink, red, purple or violet limbs. As the colour of the corolla after collecting changes determination of the colour is sometimes very difficult. In most species the claws of the wings and keel may be adnate up to 1 mm to the staminal tube, but in *A. sciureus* they are nearly free. This character is difficult to measure and the differences are not large enough to be of use in the key.
Standard: the standard is homogeneously panduriform in the whole section. But its size and the proportion of limb to claw is sometimes taxonomically useful.
Wings: The size of the limbs is their most important character. Some species, such as *A. hymenocystis, A. nervistipulus, A. strausii* and *A. uraniolimneus* have wings with a conspicuously large limb, although there are usually no sharp limits between species with respect to this character. In the isolated *A.glumaceous* group the auricles of the wings are larger than in other species of the section.
Keel: It is always distinctly shorter than the wings. The limb size is a very good character to separate the *A.glumaceous* group from other species of the section. Furthermore the limb outline is because of the variability in some taxa of no taxonomical importance. The auricle is tiny in all species.
Stamens and ovary: Except for the length of the segment, where the stamens are free from each other, none of the characters of these two organs are taxonomically important.
Fruit: Their characters are of limited use in the key: Most of the herbarium specimens are without ripe fruits, because as soon as they are ripe, flowers with fruits fall off in many species, and the specimens in this state have nearly no value for collecting. The fruits are always dorsi-ventrally compressed. Their form and indumentum do not provide distinctive characters, as they are very homogenous in the whole section. However the size of them may be used for separating two closely related species *A. chrysostachys* and *A. recognitus*.
Seeds: None of their characters are used here, firstly because they are mostly not ripe on herbarium sheets, and secondly the section is very homogeneous in their characters.

Grouping in the section

The section is divided in two subsections in this work: subsect. *Hymenocoleus* and subsect. *Hymenostegis*. The former differs from the latter mainly in having imparipinnate leaves. But the structure of inflorescence and flowers in both subsections is identical. Therefore we have preferred to reduce the monotypic sect. *Hymenocoleus* to the rank of a subsection.

Subsect. *Hymenostegis* is very homogeneous and can be scarcely grouped into natural units. In respect to similarity in some important characters we have recognized the following groups in the subsection. However there are no sharp morphological limits between the groups and the characters overlap in many cases. Therefore no formal rank is considered for the groups.

Group 1: *A. glumaceous* and *A. kohrudicus*: It is a somewhat isolated and easily determinable group within the subsection. It is characterized by very broad inflorescence, large bracts and flowers.
Group 2: *A. chehreganii* and *A. strausii*: Relatively broad inflorescence and ± large standards are the features, which connect this group with the preceding, but long peduncle and short hairs on the calyx make it easily separable from group 1.
Group 3: *A. chrysostachys, A. hirticalyx, A. hymenostegis, A. lagopoides, A. laguriformis, A.nervistipulus, A. pedicularifomis, A. persicus, A. recognitus, A. tabrizianus* and *A. velenovskyi*: This is the central group in the subsection. Most species are very variable, and some forms are so different from the typical form, that it is difficult to believe they belong to a same species, but mostly there is a continuous range of variability. Separating the species can be difficult because some of their more extreme morphs can approach neighboring species. For example short-pedunculated forms of *A. persicus* might be mistaken for *A. hirticalyx*, large bracteate forms of the former for *A. lagopoides* and so on. Because of this problem it was very difficult to prepare a diagnostic key for the group and for example *A. persicus* is cited many times in the key.
Group 4: *A. lagopodioides, A. paralurges, A. rubrostriatus* and *A. sciureus*: Lax inflorescences with remote flowers are the conspicuous characters of the group. Moreover, *A. paralurges* and *A. sciureus* have a calyx which becomes not distinctly inflated with age. *A. sciureus* possesses the longest inflorescence in the subsection. The group can not be differentiated exactly from group 3, because *A. sciureus* sometimes has a dense inflorescence like some forms of *A. persicus* with long cylindrical inflorescences. However, in *A. persicus* the calyx inflates itself soon after anthesis.
Group 5: *A. hymenocystis* and *A. uraniolimneus*: It is very near to the former group in nearly all respects but has dense inflorescences.

Geographical distribution and ecology

Almost all members of the sect. *Hymenostegis* are Irano-Turanian elements and are common in mountain regions of the Iranian highland (see map 1). Iran is the center of diversity of the section,with 17 species of which 11 are endemic in the region.Turkey with 7 species and 3 endemics, Azerbeidzhan and Armenia each with 3 species and Iraq with 2 species are other countries in which the section is native. The widest ranging species in the section are *A. chrysostachys, A. glumaceous* and *A. persicus*.

Local endemism plays a very important role in the section. Some of the species with such a distribution pattern are: *A. chehreganii* (from Guoushchi mountains N of Oroumieh lake, NW Iran), *A. hymenocystis* and *A. hymenostegis* (same area as the former), *A. pedicularifomis* (near Sultanieh in Prov. Zanjan, W Iran) and *A. laguri-*

formis (from Iraqish-Turkish border, Prov. Kordestan). It is of interest, that three of the local endemics can be found in the montain region next to the northern part of the Uroumieh lake. Apart from the species named above there are 7 more taxa of this section in the Prov. W Azarbaijan: *A. chrysostachys, A. glumaceous, A. hirticalyx, A. lagopoides, A. persicus, A. tabrizianus* and *A. uraniolimneus*.

The species of the sect. *Hymenostegis* prefer to live in higher areas between (400–) 800–3000 m. Most of them are cushion-forming plants of alpine habitats, which can be found in steppes with *Astracantha*, *Artemisia*, *Cousinia*, *Thymus* and others. Similar to other thorny *Astragali*, the species of the sect. *Hymenostegis* are adapted to dry and windy condition. Flowering and fruiting of the section occur in the months (May–)June–August.

Taxonomic enumeration

Astragalus L. sect. ***Hymenostegis*** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 57. 1868. **Lectotype** (Podlech 1990): *A. hymenostegis* Bunge.

Plants perennial, mostly cushion forming dwarf shrublets, 10–60 cm in diameter, 10–70 cm high, densely or loosely branched from the base. Hairs basifix, white or yellow, 0.1–6 mm long, with a sharp tip, the longest ones mostly on peduncle and on the calyx, the longer ones mostly somewhat thicker as the remainder. Caudex light brown to grey or black, prostrate, 0.5–3 cm thick. Stems prostrate or ascending, up to 20 cm long, 1–5 mm in diameter, hairy or glabrous, below the stipules always densely hairy, glabrescent. Stipules membranaceous or chartaceous, yellow, with 1–13 parallel nerves in free portion arising from a loose reticulate net at the base, 8–30 mm long, up to lower half adnate to petiole, otherwise connate, free portions triangular-lanceolate, acute or acuminate, younger ones appressedly hairy, later on glabrescent, sometimes ciliate. Leaves 1–20 cm long; rachides remote or dense, thin or thick, mostly rigid, with appressed or spreading hairs; petiole 1/7–1/2 the length of the rachid; end-thorn mostly present 1/10–1/1(–3 times) the length of the uppermost leaflets; terminal leaflet only present in *A. vaginans*. Leaflets in 1–13 pairs, 3–30 mm long and 1–12 mm wide, flattened or complicate, narrowly oblong-elliptic to elliptic or oblong, rarely obovate, obtuse or acute, mostly mucronate, both sides densely or sparsely appressed hairy, rarely spreadingly hairy, sometimes glabrescent, rarely glabrous. Inflorescence shorter than or overtopping the leaves; flowering part 2–25 cm long and 2–4.5 cm wide, globose to long cylindrical, sometimes lax and spicate; peduncle 0.5–30 cm long, shorter or longer than the leaves, densely appressed hairy to villose. Bracts thinly membranaceous to glumaceous, yellow, sometimes purple at tip, 8–27 mm long and 2–12 mm wide, broadly ovate at the base of inflorescence to elliptic-lanceolate further up, acute or acuminate at tip, densely or sparsely appressed hairy on midrib and apex, becoming glabrous, sometimes glabrous from the beginning, ciliate, inside of the bracts mostly glabrous, sometimes hairy especially at tip. Bracteoles rarely present, 1 or 2, 4–7 mm long and 0.5–1.5 mm wide, linear or subulate, mostly villose. Flowers sessile. Calyx yellow, sometimes purple at tip, 10–28 mm long and 3–16 mm wide, at first tubular, mostly inflating after anthesis, with 15–30 parallel nerves, which anastomose towards the teeth, densely appressed pilose, hairs initially straight, then crispate, irregularly villose or tomentose; teeth 4–12 mm long, from a shortly triangular base subulate to filiform. Corolla with white or yellow claws, limbs the same colour as the claw, or pink to purple, sometimes blue to violet towards margins. Standard 13–31 mm long; limb panduriform, hastate at base; claw cuneate. Wings slightly shorter than the standard; limb oblong, obtuse; claw somewhat longer than limb. Keel distinctly shorter than wings; limbs 5–6 mm long and 2–3 mm deep, obovate-elliptic, triangular

or rarely oblong, obtuse or minutely mucronulate, minutely auriculate at base; claw longer than the limb. Stamens as long as the keel, at upper 2.5–5 mm free from each other. Ovary 2–8 ovulate, densely appressed hairy; style hairy up to lower half. Fruit dorsi-ventrally compressed, 4–11 mm long, narrowly elliptic to elliptic or rarely ovate, ventral side straight, dorsal side curved, valves slightly expanded, densely appressed pilose; beak 0.6–2.5 mm long, straight, mostly hooked at tip. Seeds always single, 3–4.5 mm long and 2–3 mm wide, elliptic-reniform.

Key to the subsections of *Astragalus* sect. *Hymenostegis*

1 Stems elongated, internodes 1–1.5 cm long; leaves remote, imparipinnate; leaflets glabrous on adaxial surface *A.* subsect. ***Hymenocoleus***
– Stems short, internodes up to 0.7 cm long; leaves dense, paripinnate; leaflets hairy on adaxial surface *A.* subsect. ***Hymenostegis***

Astragalus L. subsect. ***Hymenocoleus*** (Bunge) Podlech & Zarre, **comb. nov.**
≡ *Astragalus* L. sect. *Hymenocoleus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 57. 1868. **Type** (monotypic): *Astragalus vaginans* DC.

Leaves imparipinnate. Otherwise see description of the species.

1. ***Astragalus vaginans*** DC., Astragal.: 210, t. 37. 1802 ≡ *Tragacantha vaginans* (DC.) Kuntze, Revis. Gen. 2: 949. 1891. **Lectotype** (here designated): 'A. orientalis flore ochroleuco' , *Tournefort* (P: Hb.VAILLANT!).

Figures: DE CANDOLLE, Astragalogia: tab. 37. 1802.

Plants c. 30 cm high, up to 40 cm including inflorescence. Hairs 0.1–2 mm, except those on calyx mostly straight, thick. Stems ascending, up to 23 cm long, growing 2–20 cm per year, in first year 2–3.5 mm in diameter, below stipules glabrous or sparsely pilose. Stipules thinly membranaceous, greenish to yellowish white, with 8–13 parallel nerves at free portion, 10–30 mm long, at a length of 4–15 mm adnate to the petiole, otherwise 2–14 mm connate, triangular-lanceolate, acuminate, glabrous or ciliate. Leaves imparipinnate, with 5–13 pairs of leaflets, 3–11 cm long; rachides remote, ± thin, flexible, straight or curved, obliquely erect or rarely deflexed, sparsely appressed hairy; petiole 1/7–1/5 the length of the rachid; terminal leaflet ± as long as the leaflets of the next pair; leaflets light green, remote or rarely dense, 10–27 mm long and 2–6 mm wide, flattened, narrowly elliptic to elliptic, acute, with a mucro up to 1 mm long, upper surface glabrous, lower surface sparsely appressed hairy. Inflorescence distinctly overtopping the leaves, dense, 3.5–5 cm long and c. 4 cm in diameter, globose to ovate; peduncle 10–15 cm long, longer than the leaves, densely covered with short and long appressed hairs, longer hairs thicker than the reaminder. Bracts chartaceous sometime hyaline at margins, yellowish white, younger ones purplish at tip, 12–17 mm long and 4–6 mm wide, ovate-elliptic, long acuminate, glabrous, ciliate, rarely sparsely appressed pilose on midrib. Calyx yellowish white with purple teeth, 13–17 mm long and 4–6 mm wide, at first tubular later on slightly elliptically inflating, with 22–30 parallel nerves, densely long appressed hairy becoming ±densely tomentose; teeth 4–6 mm long. Corolla limb purple; claws of wings and keel at the base adnate to the staminal tube. Standard 18–22 mm long; limb 12–14 mm long and 6–8.5 mm wide, elliptic or oblong-panduriform, rounded or shallowly retuse at the apex, obtusely

hastate-auriculate at base; claw 5–8 mm long. Wings 17.5–21 mm long; limbs 8.5–9.2 mm long and 2.5–3 mm wide, oblong, obtuse or rarely minutely mucronulate at tip; auricle 0.2–0.4 mm long; claw 9–12 mm long. Keel 15.5–17 mm long; limbs ca. 6 mm long and 3 mm deep, obovate-elliptic, with broadly curved lower edge and ± straight upper edge, obtuse, rarely minutely mucronulate; claw 9.5–11 mm long. Stamens at the upper 3 mm free from each other. Fruit immature. Seeds immature.
Flowering and fruiting time: VI–VII(–VIII).
Occurence: Loose forests (for example of *Pinus brutia*), mostly in somewhat humid climat.
Distribution: Turkey (Anatolia). Map 10.

Specimens seen:

Turkey. Prov. Adana: Amanus-Gebirge (Nur daglari), ca. 3 km S oberhalb Yarpuz (29 km E Osmaniye), 1200 m, 13.7.1978, *Ehrendofer et al. 787-38* (MSB) – Cappadocia, Hadjin, Kala Sekisi, 27.6.1893, *Förster 912* (M). – Prov. Maras: 78 km N Maras, zwischen Maras und Göksun, 1280 m, 7.7.1981, *Nydegger 16713* (M, MSB) – Maras-Göksun, 60 km S Göksun, 540 m, 1.6.1987, *Nydegger 42588* (MSB) – Bulghar Maaden, Al Chodscha, 1300 m, 1896, *Siehe 594* (P).

A. vaginans is the only species of the subsect. *Hymenocoleus*. Except for imparipinnate leaves and long internodes there is no difference between the two subsections. Here is the same situation as between sect. *Anthylloidei* DC. and sect. *Megalocystis* Bunge. As it was mentioned (TIETZ & ZARRE 1994), the end thorn can be absent in some forms of the species of sect. *Megalocyctis*, namely *A. ebenoides* and *A. raddei*, thus this character is bad to use for separating two sections.

Within the sect. *Hymenostegis A. vaginans* is comparable with *A.chehregani* and *A. strausii*, because of the very dense and globose to shortly cylindrical inflorescence and the short hairs on the calyx.

In hb. DECANDOLLE (G-DC) there is no original material of *A. vaginans*, therefore the specimen of hb. VAILLANT in Paris, which surely has been seen by DE CANDOLLE, is selected as lectotype.

Astragalus L. sect. *Hymenostegis* Bunge subsect. *Hymenostegis*

Leaves always paripinnate. Otherwise see description of the section.

Key to the species and subspecies of subsect. *Hymenostegis*

1 Inflorescence lax, the axis visible, if not clearly visible (some forms of *A. sciureus*), then 13–27 cm long 2
– Inflorescence dense, globose to long cylindrical, the axis not visible, shorter 5
2 Stipules 17–27 mm long; median leaves 10–16 cm long ***A. sciureus***
– Stipules 6–15 mm long; median leaves up to 8(–10) cm long 3
3 Rachides spreadingly hairy; peduncle villose ***A. lagopodioides***
– Rachides appressedly hairy; peduncle appressedly hairy or longer hairs rarely subappressed to ± patent 4
4 Median leaves 3–8(–10) cm long; rachides obliquely erect to patent; calyx at anthesis campanulate-tubular, immediately after anthesis inflated, 5–8 mm wide, elliptic-cylindrical ***A. rubrostriatus***

– Median leaves 2–3.5 cm long; rachides mostly deflexed; calyx at anthesis tubular, after anthesis not or slightly inflated, 3–4 mm wide, tubular to narrowly elliptic ***A. paralurges***

5 Keel 19–26 mm long, the limbs 7–10 mm long, 3.5–4 mm wide 6

– Keel 11–20 mm long, the limbs 4–6.5 mm long and 2.5–3.5 mm wide 7

6 Leaflets 0.5–3 mm wide, linear to narrowly oblong-elliptic, ± folded; bracts acute or shortly acuminate ***A. kohrudicus***

– Leaflets 3–12 mm wide, elliptic to broadly elliptic, flattened; bracts longly acuminate ***A. glumaceus***

7 Bracts thinly membranaceous, hyaline, never purple at tip, glabrous or only ciliate at the margins; calyx teeth and nerves of same colour as tube; corolla limb sulphureous or pale yellow ***A. chrysostachys***

– Bracts thickly membranaceous to glumaceous, sometimes purple at tip, if thinly membranaceous and hyaline at margins then calyx teeth and nerves red to purple, bracts densely pubescent or hairy only on the midrib; corolla limb pink, purple, violet, yellow to white 8

8 Inflorescence shorter than or as long as the leaves [1] 9

– Inflorescence distinctly overtopping the leaves 14

9 Leaflets in 1–3(–4) pairs ***A. laguriformis***

– Leaflets in (3–)4–10 pairs 10

10 Corolla limb pale yellow ***A. velenovskyi***

– Corolla limb pink to purple 11

11 Bracts longer than or as long as the calyx, lower ones 13–20 mm long 12

– Bracts distinctly shorter than the calyx, lower ones 9–11(13) mm long 13

12 Bracts densely pubescent or hairy at least on midrib and apex; stipules chartaceous, not hyaline; leaflets densely appressed hairy, silvery green ***A. tabrizianus***

– Bracts glabrous; stipules membranaceous, hyaline; leaflets sparsely appressed hairy, becoming glabrous, green ***A. pedicularifórmis***

13 Peduncle covered with short subappressed hairs, long hairs up to 2 mm long ***A. persicus***

– Peduncle villose, long hairs 2–3.5 mm long ***A. hirticalyx***

14 Bracts longer than or as long as the calyx, persistent in fruit 15

– Bracts shorter than the calyx, caducous, rarely persistent 17

15 Leaflets densely to sparsely spreadingly hairy; young rachides patent hairy ***A. persicus***

– Leaflets densely appressed hairy; young rachides ± appressedly hairy 16

16 Bracts very broad, lower ones 7–12 mm wide, inside hairy at apex, shortly or rarely long acuminate, acumen shorter than half of the limb, if longer, then purple tipped ***A. hymenostegis***

– Bracts narrower, lower ones 5–8 mm wide, inside glabrous at the apex, long aristate, arista more than half as long as limb, the apex mostly the same colour as the limb ***A. lagopoides***

17 Calyx 16–23 mm long, the hairs up to 6 mm long; wings 18–22 mm long, their limbs 8–12 mm long; inflorescence at least 2-times longer as wide ***A. nervistipulus***

– Calyx 12–18 mm long, the hairs up to 4.5 mm long; wings 14–18 mm long, if wings longer, then inflorescence globose or up to 1.5-times longer as wide 18

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1) In younger forms of *A. uraniolimneus* inflorescences sometimes are shorter than the leaves. This specimens can be determined from *A. hirticalyx* by their thin, hyaline and flexible stipules.

18 Corolla limb white or yellow [2] 19
– Corolla limb pink to purple or violet 21
19 Calyx nerves distinctly red to purple *A. persicus*
– Calyx nerves whitish yellow, without any contrast with the rest of tube 20
20 Hairs mostly brownish yellow; leaflets with double indumentum, i.e. densely hairy with long, subappressed straight hairs and under them shortly tomentose; pods 8–10 mm long *A. recognitus*
– Hairs pure white; leaflets simply sericeous or spreadingly hairy; pods 6–7 mm long *A. persicus*
21 Median leaves up to 5 cm long 22
– Median leaves 6–16 cm long 24
22 Standard limb ± as long as the claw or slightly longer *A. persicus*
– Standard limb 1.7–3 times longer than the claw 23
23 Rachides straight, thick, rigid, obliquely erect to subhorizontal, older ones not broken *A. uraniolimneus*
– Rachides recurved, thin, flexible, older ones mostly broken *A. hymenocystis*
a Leaflets covered with yellow hairs, thick, elliptic to broadly elliptic or obovate, obtuse at tip *A. hymenocystis* subsp. *hymenocystis*
b Leaflets white hairy, thin, narrowly oblong-elliptic, rarely narrowly obovate, mostly acute at tip *A. hymenocystis* subsp. *confiniorum*
24 Inflorescence 2–3 cm wide, ovate to long cylindrical; standard 13–22 mm long, the limb up to 1.5 times longer than the claw; bracts pubescent or glabrous *A. persicus*
– Inflorescence 3–4.5 cm wide, globose to ovate; standard 18–27 mm long, the limb 2–3 times as long as the claw; bracts glabrous or only ciliate at margins 25
25 Peduncle patent hairy; standard 20–27 mm long; wing limb 8–11 mm long; leaflets 7–30 mm long, linear to narrowly oblong *A. straussii*
– Peduncle appressedly hairy; standard 18–21 mm long; wing limb 7–8(–9) mm long; leaflets 6–18 mm long, narrowly elliptic *A. chehreganii*

2. *Astragalus chehreganii* Zarre & Podlech **sp. nov.**
Holotype: Persia, Prov. W Azarbaijan, in jugo Qushchi inter Shahpur et Rezaiyeh, 1600–1850 m, 13.6.1971, *Rechinger 41877* (W!; Iso: MSB!).

Fig. 2a

Differt ab *A. straussii* foliolis brevioribus et latioribus, pedunculo appresse (nec patenter) piloso, vexillo 18–21 (nec 20–27) mm longo et lamina alarum 7–8 (nec 8–11) mm longo.

Plantae suffruticosae, ad 40 cm altae. Caules saepe ascendentes, ad 22 cm longi, parte hornotino 1–1,5 cm longo. Stipulae firme membranaceae, flavidae, 12–17 mm longis, per 6–10 mm petiolo adnatae, acuminatae, glabrae vel margine ciliatae. Folia 2,3–11,5 cm longae, rachidibus primo flexilibus demum rigidis validis, oblique erectis ad patentibus, dense sericeis, demum glabrescentis, petiolo laminae attingente, spina terminali 1/4–1/2 longitudinis foliolorum apicalium attingente. Foliola (3–)5–11 juga, remota, 7–20 mm longa et 1,5–4 mm lata, linearia ad anguste elliptica, acuta, mucrone terminali ad 2 mm longo, plana, utrimque dense vel sparse sericea. Inflorescntia dense

2) *A. chehreganii* has a corolla which sometimes seems yellow, but with exact observation it will be clear that they are tinged with red or pink, and through drying the colour was changed. The globose inflorescence of the latter can be used as another diagnostic character for distinguishing it from yellow-flowered species of the section.

globosa, 3–4 cm diametro, pedunculo 10–21 cm longo, dense appresse piloso suffulta. Bracteae firme membranaceae, flavidae, 7–10 mm longae, ovatae ad oblongi-ellipticae, acuminatae, glabrae vel basi ciliatae. Calyx lacteus dentibus purpureis, campanulati-tubulosus, demum leviter inflatus, 13–16 mm longus et 5–8 mm latus, dense villosus, dentibus 5–7 mm longis. Corollae laminae roseae vel rubrae. Vexillum 16–21 mm longum, lamina 12–15 mm longa et 5–9 mm lata, basi hastati-auriculata, ungue 4–6 mm longo. Alae 15–19 mm longae; auricula 0,2–0,4 mm longa. Carina 14–16 mm longa. Fructus immaturus.

Plants 20–30 cm high, up to 40 cm including inflorescence. Hairs 0.1–1 mm, on peduncles up to 2(–2.5), on the calyx up to 3.5 mm long, mostly strongly appressed. Stems mostly ascending, up to 22 cm long, growing 1.5–5 cm per year, in first year 1–2.5 mm in diameter. Stipules thickly membranaceous, not hyaline, rigid, yellow, with 3–8 parallel nerves in the free portion, 12–17 mm long, at a length of 6–10 mm adnate to the petiole, otherwise 3–6 mm connate, from a narrow triangular base lanceolate, acuminate, glabrous or at margins ciliate. Leaves 2.3–11.5 cm long; rachides ± remote, rigid and thick, younger ones flexible, straight or curved, obliquely erect to horizontal or rarely deflexed, densely sericeous, later on becoming glabrous; petiole c.1/3 the length of the rachid; end-thorn 1/4–1/2 of the length of the uppermost leaflets; leaflets in (3–)5–11 pairs, ± remote, light to yellowish green, 7–20 mm long and 1.5–4 mm wide, mostly flattened, linear to narrowly oblong-elliptic, acute, with a mucro up to 2 mm long, both sides densely to sparsely sericeous. Inflorescence much higher as the leaves; flowering part 3–4 cm in diameter, densely globose or slightly wider as high; peduncle 10–21 cm long, longer than the leaves, densely covered with appressed hairs. Bracts thickly membranaceous, with hayline margins, yellowish, 7–10 mm long and 3–6 mm wide, ovate to elliptic-oblong, acuminate, glabrous or only at the base ciliate. Calyx creamy with purple teeth, tubular-campanulate, slightly inflating after anthesis, 13–16 mm long and 5–8 mm wide, with 15–25 parallel nerves, ± densely villose; teeth 5–7 mm long. Corolla pink to red, the claws pale yellow, the claws of the wings and the keel up to 2 mm adnate to the staminal tube. Standard 16–21 mm long; limb 12–15 mm long and 5–9 mm wide, oblong-panduriform, emarginate or rarely rounded at the apex, sharply or obtusely hastate-auriculate at base; claw 4–6 mm long, cuneate. Wings 15–19 mm long; limb 7.3–9 mm long and 2.5–3.7 mm wide, narrowly oblong to oblong, obtuse, rarely minutely mucronulate at tip; auricle 0.2–0.4 mm long; claw 8–10.5 mm long, 1.1–1.5 times as long as the limb. Keel 14–16 mm long; limbs 5–6 mm long and ca. 3 mm deep, obovate-triangular or -elliptic, lower edge ± right-angled, upper edge convex, obtuse or minutely mucronulate at tip; auricle small; claw 9–11 mm long. Stamens at upper 4–5 mm free from each other. Fruit immature. Seeds immature.
Flowering and fruiting time: (V–)VI–VIII.
Occurence: Dry mountainous steppes; 1500–1700 m.
Distribution: NW Iran: Around Uroumieh. Map 2.

Specimens seen:

Iran. Prov. W Azarbaijan: Shahpour to Rezaieh, Ghoushchi pass, 22.6.1961, *Sharif 40923* (W) – Maragheh, Ghoushchi pass, 27.6.1965, *Arghand 6721* (W) – Pass SE Shahpur, 1750 m, 6.7.1968, *Petrovitz 81* (W) – Rezaieh, Goushchi pass, 1690–1820 m, 20.6.1970, *Termeh 14658* (W) – Shahpur to Rezaieh, Goushchi, 13.6.1971, *Iranshahr 14751* (W) – In declivibus borealibus jugi Qushchi inter Shahpur et Rezaieh, 1700 m, 21.7.1974, *Rechinger 49808* (W) – dito, 1600–1850 m, 13.6.1971, *Rechinger 41877* (MSB!, W!).

The species is very closely related to *A.strausii*, which occurs on the mountainous slopes located in northern centeral Iran. In addition to geographical differentiation, the new species differs in many morphological aspects from *A. strausii*: The leaflets are shorter and broader, standard is somewhat shorter, the peduncle is appressedly hairy (in *A. strausii* it is villose). Moreover, the peduncle of *A. strausii* is distinctly thicker than that of *A. chehreganii*. Limb of the corolla is pink to red in *A. chehreganii*, but sometimes they become yellow during drying but then their margins remain tinged with red. The species is named in honour of Mr. A. Chehregani, the plant biologist of the Bou-Ali University of Hamadan.

3. ***Astragalus chrysostachys*** Boiss., Diagn. Pl. Or. Nov. 2: 69. 1843 ≡ *Tragacantha chrysostachys* (Boiss.) Kuntze, Revis. Gen. 2: 944. 1891. Syntypes: Persia, *Aucher 1272* (G!); prope Ispahan, *Aucher 4401*; in Prov. Aderbidjan, *Aucher 4401A* (G!, G-BOIS!, LE!, P!, W!); et *4403* (W!). **Lectotype** (here designated): prope Ispahan, *Aucher 4401* (G-BOIS!; Iso: G!, LE!, P!, W!).
= *A. melanostictus* Freyn, Bull. Herb. Boiss. 5: 603. 1897. Holotype: Persia occ., Prov. Irakadjmi, Sultanabad ad Mowdere, 26.5.1894 [1892], *Strauss* (BRNM!; Iso: B!, W!)
= *A. chrysostachys* var. *villosus* Bornm., Beih. Bot. Centralbl. 19(2): 233. 1906. Syntypes: Sultanabad, ad Mowdere, 5.4.1889; 8.6.1890; 16.5.1892 (B!); et 26.5.1892, alle *Strauss* (B!, W!); in monte Schahsinde, VI.1897, *Strauss* (B!: foto MSB!, G!); in monte Raswend, V.1896; VII.1897, alle *Strauss* (B!); prope Burudschird, VI.1898, *Strauss*. Lectotype (here designated): prope Brudschird, VI.1898, *Strauss* (B!).
= *A. chrysostachys* Boiss. var. *parisiensis* Sirj. & Rech.f., Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 1953: 184. 1953 ≡ *A.chrysostachys* Boiss. f. *parisiensis* (Sirj.& Rech.f.) Parsa, Fl. Iran 9: 91. 1966. Holotype: Lorestan, Mte. Paris, [7000 ft, 28.5.1940] *Koelz 15880* (W!).
= *A.chrysostachys* var. *khorassanicus* Sirj. & Rech.f., Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 1953: 156. 1953. Holotype: Montes Kopet-Dagh, inter Kuchan et jugum Alamli, 1600 m, 3.6.1948, *Rechinger & Aellen 4802* (W!: foto MSB!; Iso: B!, G!, MSB!)
= *A. chrysostachys* var. *kopetdaghensis* Sirj. & Rech.f., Repert. Spec. Nov. Regni Veg. 48: 48. 1940. Holotype: Khorasan, Kopet-Dagh, zwischen Kuchan und Lutfabad, Paß Alamli, 2000 m, 14.7.1937, *Rechinger 1655* (W!; Iso: BM!, G-AELLEN!)
= *A.chrysostachys* var. *sericeus* Bornm., Beih. Bot. Centralbl. 19(2): 233. 1906. Syntypes: inter Sultanabad et Kum, Latedar, 10.6.1895, *Strauss*; ibidem, Kuh-Tefresch, VI.1897, *Strauss* (B!: foto MSB!). Lectotype (here designated): inter Sultanabad et Kum, Latedar, 10.6.1895, *Strauss* (B!: foto MSB!).
= *A. sosnowskyi* Grossh., Fl. Kavkaza 2: 299. 1930., in clave, rossice et in Trudy Tbilissk. Bot. Inst. 12: 236. 1948, descr. emend. (latine). Type: Turkey, distr. Olty, prope p. Karnawaz, 7.7.1911, *Sosnovsky* (Iso: B!: foto MSB!).

Fig. 4a

Plants 10–25 cm high, up to 40 cm including inflorescence. Hairs 0.1–1 mm, on peduncle up to 2 mm, on calyx up to 4.5 mm long. Stems 1.5–15 cm long, ascending to prostrate, growing 1–5 cm per year, in first year 2–3 mm in diameter. Stipules whitish or yellow, thinly membranaceous, hyaline, fragile, mostly wrinkled, older ones often folding downwards, with 1–8 parallel nerves in upper part, at tip mostly only with one obvious nerve, 7–22 mm long, at a length of 5–10 mm adnate to the petiole, otherwise 1–4 mm connate, triangular-lanceolate, acute or acuminate, glabrous,

sometimes ciliate at margins. Leave 1–11 cm long; rachides dense, obliquely erect, straight or recurved or rarely deflexed, ± thick and rigid, densely covered with short appressed or spreading hairs; petiole 1/4–1/3(–1/2) the length of rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in 4–10 pairs, remote or ± dense, whitish green to dark green, ± flattened, 5–25 mm long and (1.5) 2–6(–7) mm wide, narrowly oblong-elliptic to elliptic or rarely broadly elliptic, acute or obtuse, with a mucro up to 2.5 mm long, both sides densely appressed sericeous or with spreading hairs. Inflorescence dense, younger ones ovate, becoming cylindrical, 3–10 cm long and 2–3.5 cm wide; peduncle often longer than the leaves, 3–20 cm long, densely covered with short appressed to spreading hairs up to 1 mm long, and between them some appressed to subappressed straight thick hairs up to 2 mm long. Bracts yellowish, thinly membranaceous, hyaline especially towards margins, lower ones 7–20 mm long and 3–8 mm wide, ovate-elliptic to lanceolate, acuminate, glabrous or only sparsely ciliate at margins. Calyx greenish-yellow becoming whitish-yellow, at first tubular, soon globosely or elliptically inflated, 12–16 mm long and 4–8 mm wide, with 20–30 parallel nerves, ± densely long appressed hairy becoming sparsely villose; teeth 3.5–9 mm long. Corolla pale sulphureous. Standard 14–22 mm long; limb 9–13 mm long, 5.5–8 mm wide, oblong-panduriform, towards the tip narrowing into an obtuse apex, often obviousely mucronulate at tip, sharply auriculate at base; claw 5–9 mm long, broadly cuneate. Wings 13–19 mm long; limb 6–8 mm long and 2–3 mm wide, narrowly oblong to oblong or at the apex somewhat expanded, obtuse; auricle 0.4–1 mm long; claw 7–12 mm long. Keel 12.5–17 mm long; limbs 5–6 mm long and 2.5–3.5 mm deep, triangular-obovate to ± oblong, with almost rectangular lower edge and ± concave upper edge, obtuse, minutely mucronulate; auricle very short; claw 7.5–12 mm long. Stamens at upper 3–5 mm free from each other. Fruit 6–7 mm long, 1.5–2.8 mm high and 2.5–3.5 mm wide. Seeds olive green, light to dark brown, ± flattened, 3–4.5 mm long and 1.5–2.8 mm wide, elliptic to broadly elliptic, mostly rugose, rarely (younger ones) smooth.
Flowering and fruiting time: V–VII.
Occurence: Mountainous dry stepps, with clay or limestone as substrate, alt. 1200–3600 m.
Distribution: Turkey, NE Iraq, Iran. Map 2.

Specimens seen:
1. Typical *A. chrysostachys*:

Turkey. A8 Erzurum: Dultu dagi, NW Oltu, 16.7.1989, 2300 m, *Nydegger 44454* (MSB) – distr. Olty, prope p. Karnawaz, 7.7.1911, *Sosnovsky* (B, foto MSB).

Iran. Prov. Tehran: Telu, NE Tehran, 1800 m, 4.6.1972, *Dini & Arazm 15752* (W) – Aragadj, nr. Varamine, 7400 ft, 30.6.1954, *Brown 1921* (W) – In m. Gerdene Kutschek prope urbem Teheran, 24.6.1843, *Kotschy 400* (G, G-BOIS, LE, W) – Demawend: bei Pul-i-Djadjerud, 29.6.1909, *Bornmüller 600* (B). – Prov. Markazi: inter Sultanabad et Kum, Latedar, 10.6.1895, *Strauss* (B, foto M) – In dit.urb. Sultanabad, Tefresch in montibus, VI.1897, *Strauss* (B) – ibidem, Kuh-Tefresch, VI.1897, *Strauss* (B!: foto MSB!) – In montibus ad Sultanabad, 26.5.1892, *Strauss* (BR) – In m. Kuh Gäsawend, 1.7.1909, *Strauss* (B) – Mowdere, 20.6.1890, 26.6.1892, *Strauss* (B) – In monte Tschehar-Khatun, ad m. Raswend, VI.1902, *Strauss* (LE, B) – In monte Raswend VII.1892, *Strauss* (B) – In monte Schahsinde, VI.1897, *Strauss* (B: foto MSB, G). – Prov. W. Azarbaijan: In jugo inter Balanesh et Oshnovieh, 1650–1900 m, 11.7.1974, *Rechinger 49279* (W) – 38 km S de Rezaiyeh, Darreh-ye-Ghasemlou, 1500–1650 m, 3,6.1978, *Matin & Daneshpajouh 38410* (W) – 15 miles SE Mahabad, 5000 ft, 20.5.1962, *Furse 2150* (W) – Oroumieh, Razhan, Khalil-kuh, 1600–1800 m, 9.7.1994, *Chehregani & Zarre 17877* (M, TARI, TUH) – Rezaieh, Band, 1450–1600 m, 15.6.1977, *Moussavi & Tehrani 36816* (W) – 44 km S de Rezaiyeh, Darreh-ye-Ghasemlou,

1850–1990 m, 10.6.1978, *Matin & Daneshpajouh 38385* (W) – In declivibus siccis inter Oshnoviyeh et Naqadeh, 1500 m, 8.7.1974, *Rechinger 49023* (W). – Prov. E. Azarbaijan: Maragheh, Kuh Sahand, 20.6.1965, *Esfandiari 6329 E* (W) – Prov. Zanjan: 15 km from Zanjan on the road to Bijar, 1900 m, 30.5.1974, *Wendelbo et al. 11855* (LE, W) – Dizaj-abad, 1500 m, 19.6.1983, *Moussavi et al. 41071* (W). – Prov. Kordestan: In saxosis et ad versuras 47 km W Bijar versus Divandarreh, 2000 m, 2.7.1971, *Rechinger 42649* (W) – Kowleh 65 km N of Sanandaj versus Divandarreh, 29.6.1974, *Rechinger 48525* (W) – Bijar to Sanandaj, 72 km to Sanandaj, 1950 m, 1.7.1971, *Termeh 40782* (W) – Bijar to Sanandaj, 60 km to Sanandaj, 2000 m, 2.7.1971, *Termeh 40879* (W) – Kowleh 65 km N of Sanandaj versus Divandarreh, 29.6.1974, *Rechinger 48525* (W) – 20' N of Sanandaj, 4500 ft, 17.5.1962, *Furse 2092* (W) – c. 18 km N of Sanandaj, 1500 m, 10.6.1959, *Wendelbo 1862* (BG, LE, W) – Sanandaj to Marivan, 16.6.1956, *Sabeti 22* (W) – 11 km W of Sanandaj, inter Sanandaj et Marivan, road cut bank, 26.5.1960, *Bent & Wright 526-201* (W) – Sanandaj, 1200–1400 m, 27.5.1963, *Jacobs 6729* (BG, W) – 26 km E of Sanandaj, 2200 m, 28.6.1965, *Ledingham, Zohary et al. 4237* (LE, W) – 15 km to sanandaj from Kamyaran, 1500 m, 7.7.1994, *Chehregani & Zarre 17852* (M, TARI, TUH) – In graminosis siccis jugi prope Salavatabad, 25 km E Sanandaj, 2300 m, 3.7.1971, *Rechinger 42797* (W) – Sanandaj to Hammadan, pass Salavat-abad, 2400 m, 3.7.1971, *Termeh 40959* (W). – Prov. Kermanshah: Weg nach Sanandaj, 18.5.1951, and 21.5.1951, *Sharif 2548, 2612* (W) – rocky top of Zagros mts., road to Ilam, 120 km SW of Kermanshah, 2000 m, 30.6.1965, *Ledingham & Bonvan 4262* (LE). – Prov. Hamadan: Aq Bulaq, c. 100 km N Hamadan, 15.4.–1.6.1960, *Rioux & Golvan 311* (W) – bei Yalpan, 25.5.1882, *Pichler* (G-BOIS, W). – Prov. Lorestan: In dit. urb. Burudjird, in montibus, VI.1898, *Strauss* (B) – Kharon bei Bisheh, 1300 m, 3.6.1937, *Köie 1264* (B, C, W) – In saxosis calc. 30 km SE Khorramabad versus Safid Dasht, 1750 m, 12.6.1974, *Rechinger 47779* (W) – Dorud region, hills betwen Sarawan and Dorud, about 16 km from Dorud, 16.6.1974, *Alava 13881* (TUR) – Shuturun-kuh foothills, Azna, 6000 ft, 6.5.1962, *Furse 1791* (W) – Paris Mt., 7000 ft, 28.5.1940, *Koelz 15880* (W). – Prov Bakhtiari: Oregon between Kuhreng and Damane, 2300 m, 1.6.1959, *Wendelbo 1718* (BG, LE, W). – Prov. Esfahan: prope Ispahan, *Aucher 4401* (G, G-BOIS, LE, P, W). – Not exactly to localize: In Prov. Aderbidjan, *Aucher 4401A* (G, G-BOIS, LE, P, W).

2. Specimens with a tendency to have shorter and thicker peduncles and longer leaflets consistent with the type of *A. chrysostachys* var. *kopetdaghensis*:

Iran. Prov. Khorassan: Shirvan, Namanlou, Golule, Cheshmeh-garbi, 2400 m, 19.7.1986, *Termeh et al. 41375* (W) – 30 km SW of Darreh Gaz, Tandureh Wildlife Reserve, Cheshmeh-e Shekerab, 5 km NE of Incheh Kekanlu, 2000 m, 9.7.1973, *Edmonson 1294* (W) – Kopet-Dagh, zwischen Kucan und Lutfabad, Paß Alamli, 2000 m, 14.7.1937, *Rechinger 1655* (BM, G-Aellen, W) – 40 mile Dareh-Gaz versus Gouchan, 2100 m. 24.7.1972, *Iranshahr & Zargani 15204* (W) – Dare-Gaz to Gouchan, Dordaneh, Allah-Akbar, 24.7.1972, *Iranshahr & Zargani 15217* (W) – Ghoutchan, Emamgholi to Darreh Gaz, Gappi, 2000 m, 15.7.1986, *Termeh et al. 41376* (W) – entre Kuchan et Bajgiran, 1100–1600 m, 3.7.1956, *Schmid 6314, 6315* (W) – Chakaneh Bala 40 km S Quchan, ad versuras, 1500–1600 m, 17.6.1975, *Rechinger 53723* (W) – Neyshabur, Sheykh Abol-Hassan, Binaloud, 1500–2250 m, 30.–31.7.1976, *Termeh & Tehrani 35141* (W) – environs de Mughan et versant nord de la Kuh-i-Binalud, 1900–2300 m, 20.–21.6.1956, *Schmid 6207* (LE, W) and *6237* (W) – In montibus serpentinicis inter Turbat-e Haidari et Assadabad, 27.5.1948, *Rechinger, Aellen & Esfandiari 4410* (W).

3. Forms with peduncles longer than the leaves and almost thin, consistent with var. *khorasanicus*:

Iran. Prov. Khorasan: Montes Kopet-Dagh, inter Kucan et jugum Alamli, 1600 m, 3.6.1948, *Rechinger & Aellen 4802* (B, G, M, W) – Montes Hazar Masdjid, inter Tolgor et Gash, c. 1800 m, 7.–10.6.1948, *Rechinger, Aellen & Esfandiari 5185* (W, G).

A. sosnowskyi can not be lectotypified, before the herbaria of BAKU and TBI will be studied. It is just a small form of *A. chrysostachys* with short, but largely inflated calyx. This form can be found in different areas and can not be taxonomically separated. The comparison of this taxon with *A. lagurus* (*A. lagopoides* rightly), made in Flora of Turkey, is irrelevant. The material which was determined in this work as *A. sosnowskyi* all belongs to *A. lagopoides*.

The most typical characters of *A. chrysostachys* are thin and hyaline bracts and stipules beside the yellow corolla limb. However some forms of *A. persicus* (forms, which are consistent with the type of *A. manucherii*) show also such characters of bracts and stipules. They can be separated from *A. chrysostachys* in respect to their purple calyx nerves and purple-tinged standard limb.

4. ***Astragalus glumaceus*** Boiss., Diagn. Pl. Or. Nov. 2: 69. 1843 ≡ *Tragacantha glumacea* (Boiss.) Kuntze, Revis. Gen. 2: 60. 1891. **Holotype**: Persia, *Aucher 1278* (G-BOIS!; Iso: P!, MSB!).

Fig. 1a

Plants 15–25(–40) cm high, with fragile thorns. Hairs 0.1–1.5 mm, on peduncles sometimes up to 2.5 mm and on the calyx up to 6 mm long, mostly straight. Stems prostrate or ascending, up to 15(–30) cm long, growing 1–5 mm per year, in first year 2–5 mm in diameter. Stipules chartaceous, yellow or whitish to yellow, with 5–8 parallel nerves in the free portion, 8–22 mm long, at a length of 4–7 mm adnate to the petiole, otherwise 2–10 mm connate, from triangular base lanceolate-acuminate, glabrous or ciliate at margins. Leaves 2–13(–18) cm long; rachides ± dense, white or whitish green, often rigid and thick, obliquely erect, longer ones mostly incurved, sparsely appressed shortly hairy to glabrous; petiole (1/5–)1/4(–1/3) the length of the rachid; end-thorn 1/3–1/1 the length of the uppermost leaflets; leaflets in 2–5 pairs, whitish green to light green, ± remote, 10–30 mm long and 3–12 mm wide, flattened, elliptic to broadly elliptic, obtuse or acute, with a mucro up to 3(–4) mm long, both sides sparsely shortly appressed or rarely spreadingly hairy, glabrescent. Inflorescence mostly sessile, dense or lax, flowering part 5–16 cm long and 3.5–4.5 cm in diameter, shorter than or as long or rarely longer than the leaves, at first ovate, becoming cylindrical; peduncle 0–5 cm long, densely to sparsely covered with appressed to subpatent short and long hairs. Bracts thickly membranaceous, not hyaline, yellowish, purple or brown at tip, (12–)17–27 mm long and 5–9 mm wide, broadly ovate at the base of the inflorescence to lanceolate-elliptic further up, longly acuminate, glabrous, younger ones sparsely ciliate. Calyx whitish or creamy, towards the teeth purple, at first tubular, soon inflated, 19–26 mm long and 4–10 mm wide; at fruiting time 22–28 mm long and 8–16 mm wide, globose to broadly elliptic, with 22–30 parallel nerves, densely long appressed hairy becoming densely to sparsely villose; teeth 7–12 mm long. Corolla claws pale yellow, limbs purple becoming light to dark brown. Standard 20–30 mm long; limb 12–18 mm long and 7–11 mm wide, elliptic-panduriform, shortly acuminate or rarely rounded at the apex, hastate-auriculate at base; claw 8–12 mm long, ± broadly cuneate. Wings 19–27 mm long; limb 9–12 mm

long and 2.5–3 mm wide, narrowly oblong to oblong, obtuse; auricle 0.7–1.2, mm long; claw 11–16 mm long. Keel 18–25 mm long; limbs 7.5–10 mm long and 3.5–4 mm deep, elliptic, with curved lower edge and concave upper edge, obtuse, minutely mucronulate; auricle distinct; claw 9–15 mm long. Stamens at the upper 5–6 mm free from each other. Fruit 6–11 mm long, 1.5–2 mm high and 3–4 mm wide. Seeds light to dark brown, ca. 4 mm long and 2.5 mm wide, elliptic-reniform, flattened, pitted.
Flowering and fruiting time: V–VIII.
Occurence: Mountainous dry stepps, with clay or limestone as substrate, sometimes at margins of loose walds of *Quercus brantii;* alt. 1100–2300 m.
Distribution: Iran: NW, W and C of Iran, along the Zagros and Elburz ranges. Map 3.

Specimens seen:

Iran. Prov. Tehran: Elburs, Kuh Daschteh, 2000 m, 15.8.1937, *Gauba 1477* (B). – Prov. Markazi: prope Djekab inter Sultanabad et Kaschan, VII.1903, *Strauss* (B) and VI.1904, *Strauss* (B, BM) – In m. Kuh-i-Emrullah, 3.6.1908, *Strauss* (B). – Prov. W. Azerbaijan: In declivibus siccis 5 km SW Naqadeh, 1500 m, 14.7.1974, *Rechinger 49373* (W) – In declivibus boreo-occidentalibus jugi inter Oshnovyeh et Ziveh, 1850 m, 14.7.1974, *Rechinger 49406* (W) – Chavan Bala, c. 13 km N of Maragheh, S of Kuh-e Sahand, 1965 m, 10.8.1966, *Wright 19* (W). – Prov. E. Azarbaijan: prope electric road in Kaflan Kuh, 1100–1500 m, 2.6.1971, *Lamond & Iranshahr 41046* (W) and *40821* (W) – Mianeh, Ghaphlan Kuh, 1500, m, 29.5.1971, *Iranshahr 41032* (W) – 5 km W de Mianeh vers Tabriz, 1100 m, 18.6.1978, *Termeh et al. 39849* (W) – 6 km NW of Shahindez, 1380 m, 4.6.1974, *Wendelbo et al. 12123* (LE, W) – Mianeh to Gharah-Chaman, 1300 m, 26.5.1987, *Maassoumi 64879* (M). – Prov. Zanjan: 27 km a Zanjan boreo-occidentem versus, ad viam versus Mianeh ducentem, 1500 m, 13.6.1977, Rechinger 56576 (W) – c. 10 km boreo-occid. ab oppido Zanjan, 26.7.1977, *Sojak 7699, 7701* and 5.7.1973: *7475, 7583* and *7593* (all PR) – Dizaj Abad, 1500 m, 19.6.1983, *Moussavi et al. 41072-E* (W) – 12 km from Zanjan on the road to Bijar, 1890 m, 16.7.1974, *Assadi & Amini 13543* (W) – In declivibus argillosis 85 km SW Zanjan versus Bijar, 1500 m, 30.6.1971, *Rechinger 42416* (W). – Prov. Kordestan: Bijar, Gaure-Chai, Kouh-e Bash, 2000–2100 m, 10.7.1968, *Iranshahr & Drezfoulian 40810* (W) – 5 km to Divandarreh from Sanandaj, 1650 m, 7.7.1994, *Chehregani & Zarre 17856* (MSB, TARI, TUH) – 26 km E of Sanandaj, 2200 m, 28.6.1965, *Ledingham, Zohary et al. 4242* (W) – inter Sanandaj et Salavatabad, 2000 m, 3.7.1971, *Rechinger 42825* (W) – Sanandaj to Hammadan, pass Salavat Abad, 1900 m, 2.7.1971, *Termeh 40914* (W). – Prov. Kermanshah: Kermanshah, Tagh-e Bostan to Parrow mts., 10 km on the sandy road after military station, 1500–1600 m, 6.7.1994, *Chehregani & Zarre 17814* (MSB,TARI, TUH) – 3 km W of Harsin, 60 km E of Kermanshah, 26.6.1965, Ledingham, *Bonvan, et al. 4203* (W) – Dry cultivated hilltops at Dinard, 40 km from Biston, 80 km NE of Kermanshah, 26.6.1965, *Ledingham & Zohary 4210* (LE) – 11 km to Sahneh from Kangavar, 1420 m, 6.7.1994, *Chehregani & Zarre 17808* (MSB, TARI, TUH) – 36 km W Tuiserkan, 1640 m, 9.6.1959, *Pabot 1575* (G). – Prov. Hammadan: Aq Bulaq, c. 100 km N Hammadan, 15.4.–1.7.1960, *Rioux & Golvan 312* (G, W) – Aghbolagh, *Pabot 12490-E* (W) – In monte Elwend, 1882, *Pichler 377* (B) – Kuh Alvand, 7.6.1965, *Bahar 6683* (W) – In mont. Gerae pr. Nehawend, VIII.1898, *Strauss* (B) – Nahavand, 1400–1500 m, 23.6.1963, *Jacobs 6987* (W) – auf trockenen Abhängen oberhalb Haydare, 29.6.1982, *Pichler* (W). – Prov. Esfahan: In m. Kuh-i-Kohrud, VI.1908, *Strauss* (B, W) – Ishabad, 20 km W of Najaf Abad, c. 1900 m, 12.6.1965, *Ledingham & Assefi 4142* (W) and *Asefi* in hb. PABOT *AE95* (G). – Prov. Lorestan: Burujird, 9.7.1942, *Koelz 18633* and *18639* (W). – Prov. Bakhtiari: at the village Kuhruye Hash, 39 km from Shahreza on the road of Semirom, 2300 m, 5.6.1974, *Alava 13542* (TUR). – Not exactly to localize: Persia, *Aucher 1278* (G-BOIS, P, MSB) – In Persiae occid. in montosis (sine indicatione loci), *Strauss* (B) – Dumbe Kemer, 24.6.1905, *Strauss* (B).

The species is easily distinguishable from all other species of the section by its large flowers. As mentioned above *A. glumaceous* and *A. kohrudicus* form the most isolated group in the section. See also the note under *A. kohrudicus*.

5. ***Astragalus hirticalyx*** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 67. 1868 et l.c. 15(1): 110. 1869 ≡ *Tragacantha hirticalyx* (Bunge) Kuntze, Revis. Gen. 2: 945. 1891. **Lectotype** (here designated): In summo monte Aferowdagh Kurdistaniae Armeniae, inter lacum Wan et Prov. Müküs, 11000 ft, *Kotschy suppl. 807* (G-BOIS!; Iso: G-BOIS!, LE!, P!, W!: foto MSB)
= *A. mishouensis* Turrill, Kew Bull. 1930: 379. 1930. Holotype: N Persia, Tabris district, summit of Mishou Dagh, 30.8.1928, *Gilliat-Smith 2484* (K!: foto MSB!)
= *A. porphyrodon* C.C.Towns., Kew Bull. 25: 462. 1971. Holotype: Iraq, Helgord range, 3350 m, 3.9.1957, *Rawi & Serhang 24808* (K!; Iso: BAG).

Figures: TOWNSEND, Fl. Iraq 3: 376, pl. 61 (as *A. porphyrodon*). 1974.
Fig. 5 e

Plants 10–15 cm high. Hairs 0.1–1 mm, on peduncle up to 3.5 mm, on calyx up to 4 mm long. Stems prostrate to ascending, 1–9 cm long, growing 0.5–3 cm per year, in first year 1–2.5 mm in diameter. Stipules chartaceous, yellowish, with 5–13 parallel nerves at free portion, 10–16 mm long, at a length of 6–10 mm adnate to the petiole, otherwise 1.5–5 mm connate, lanceolate, acuminate, glabrous, sometimes ciliate. Leaves 0.9–7.5 cm long; rachides very dense, rigid, thick, straight, oblique to subhorizontal, densely to sparsely covered with appressed to subappressed hairs; petiole 1/4–1/3 the length of the rachid; end-thorn 1/2–3 times longer than the uppermost leaflets; leaflets in (3–)4–6 pairs, remote or sometimes dense, greyish-green, 4–16 mm long and 1.5–4 mm wide, narrowly oblong-elliptic to elliptic, mostly complicated, acute, with a mucro up to 1.5 mm long, densely to sparsely sericeous. Inflorescence shorter or as long as the leaves, ± dense, globose, 2–3.5 cm in diameter; peduncle 0.5–3 cm long, densely villose. Bracts thickly or thinly membranaceous, not hyaline or only at margins hyaline, yellowish, rarely red at tip, 8–15 mm long and 5–8 mm wide, broadly ovate to lanceolate-elliptic, glabrous, sometimes ciliate at margins. Calyx whitish or creamy, purple towards the teeth, at first tubular, later on ovoid to elliptically inflated, 10–14 mm long and 3.5–7 mm wide, with 13–17 parallel nerves, densely appressed hairy becoming sparsely villose; teeth 4–7 mm long. Corolla yellowish at claws, limbs pink to red or violet. Standard 15–20 mm long; limb 10–14 mm long and 6–7 mm wide, oblong-panduriform, retuse at tip, minutely mucronulate, sharply hastate at base; claw 5–6 mm long, broadly cuneate. Wings 14–17 mm long; limb 5.5–7.5 mm long and 2–3 mm wide, oblong, sometimes expanded in upper third, obtuse; auricle 0.3–0.7 mm long; claw 8–10.5 mm long. Keel 12–15 mm long; limbs ca. 5 mm long and 2.5 mm deep, obovate-triangular, with almost rectangular lower edge and straight or ± convex upper edge, obtuse, minutely mucronulate; auricle tiny; claw 7–10 mm long. Stamens at the upper 2.5–3.5 mm free from each other. Fruit 5–6.5 mm long, ca. 2 mm high and 3–4 mm wide. Seeds brown, ca. 3 mm long and 2.2 mm wide, broadly elliptic to rounded, pitted.
Flowering and fruiting time: VI–VIII.
Occurence: Mountainous stepps with ± scarce vegetation, and in association with other cushion-forming plants like *Astracantha spp.* and *Acantholimon spp.*, 2000–3100 m.
Distribution: E Turkey, Iraq, NW Iran. Map 3.

Specimens seen:

Turkey. Prov. Bitlis: Taurus Armenius, In monte Meleto (Meretug) Dagh districtus Bitlis, in humosis opimis, 2600–3100 m, 11.8.1910, *Handel-Mazetti 584* (W). – Prov. Van: In summo Agerow Dagh inter lacum Wan et Prov. Müküs, 11000 ft, 23.9.1859, *Kotschy 807* (G-BOIS, LE, P, W: foto MSB) – Gürpinar to Baskale, Güzeldere, Gecidi, 2760 m, 12.8.1987, *Engel 114* (MSB).

Iraq. MRO: Helgord range, 3350 m, 3.9.1957, *Rawi & Serhang 24808* (K).

Iran. Prov. W Azarbaijan: In monte Chalil Kuh prope Razhan, 2600–3200 m, 2.7.1974, *W.Rechinger & Renz 48846b* (W). – Prov. E Azarbaijan: 5 km E of Kandujan (= 33 km of Khosroshah), on Sahand mountain, 2900 m, *Grant 128* (W) – Kiyamaki Protected Region, Kiyamaki Dagh ad boreo-orientem a pago Miab, 2500–2600 m, 17.6.1977, *Rechinger 56856* (W) – Tabris district, summit of Mishou Dagh, 30.8.1928, *Gilliat-Smith 2484* (K: foto MSB) – near Tabriz, 22.8.1968, *Abai 13332* (W) – Gaimas mt. near Ardebil, 7800 ft, 17.7.1959, *Brown 2116 E & F* (W) – 29 km to Sarab from Ardebil, 2000 m, 5.7.1965, *Babakhanlu 19980* (W) – Sarab to Kuh Sabalan, 26.7.1965, *Termeh 13276* (W) – Montes Sabalan, in declivibus borealibus saxosis (Radar Road), 2650 m, 14. et 17.7.1971, *Lamond & Termeh 4784* (LE, W), in RECHINGER *44129* (W) – Ardebil, Ghotour-So, Kouh-e Sabalan, 2600 m, 17.7.1971, *Termeh 41021* (W).

A. mishoensis was mistakenly attributed to sect. *Rhacophorus* of the subgenus *Tragacantha* (today genus *Astracantha* Podlech). We could not find any significant difference between it and *A. hirticalyx*.

Shortly pedunculated forms of *A. persicus* seem similar to *A. hirticalyx*, but they are easily recognized by differences in the indumentum on the peduncle: In *A. hirticalyx* villose and hairs up to 3.5 mm long, in *A. persicus* (just shortly pedunculated forms) appressed with hairs up to 2 mm long.

Thin textured bracts separate *A. hirticalyx* from other shortly pedunculated species of the section, namely *A. tabrizianus*.

The specimens cited by MAASSOUMI (1995) as *A. hirticalyx* belong mostly to *A. uraniolimneus*.

See also the note of *A. uraniolimneus*.

6. ***Astragalus hymenocystis*** Fisch. & C.A.Mey., Bull. Soc. Imp. Naturalistes Moscou 26(2): 449. 1853 ≡ *Tragacantha hymenocystis* (Fisch. & C.A.Mey.) Kuntze, Revis. gen. 2: 945. 1891. **Lectotype** (PODLECH & SYTIN, here designated): ad limites Turciae distr. Khoi, Prov. Atropatanicae, 17.6.1828, *Szovits 544* (LE!; Iso: G-BOIS!, H!, L!, LE!, M!, P!, W!: foto MSB!)

= *A. sirensis* Turrill, Kew Bull. 1930: 382. 1930. Holotype: N Persia, Mt. Sir, Urmia distr., 27.5.1929, *Gilliat-Smith 2281* (K!).

Plants 10–20 cm high. Hairs 0.1–1.5 mm, on the peduncle up to 3 mm, on the calyx up to 4 mm long, straight or crispate. Stems from a prostrate base ascending, up to 13 mm long, growing 0.5–4 cm per year, in first year 1–3 mm in diameter. Stipules thinly membranaceous, yellowish white or white, with 1–3 parallel nerves at free, 8–13 mm long, at a length of 5–8 mm adnate to petiole, otherwise 0.5–1.5 mm connate, from a triangular base lanceolate, acuminate or acute, ciliate. Leaves 0.4–3.5 cm long; rachides very dense, mostly recurved and turning back, thin, flexible, densely spreading hairy; petiole 1/4–1/2 the length of the rachid; end-thorn 1/4–1/2(–1/1) the length of the uppermost leaflets; leaflets dense, grey or yellowish green, strongly complicated, 3–7 mm long and 2–3.5 mm wide, elliptic to broadly elliptic, towards the apex of the rachid obovate to orbicular, obtuse, minutely mucronulate or without

mucro, densely covered with short hairs and between them with dense subappressed ± long hairs, becoming simply pilose. Inflorescence overtopping the leaves; flowering parts densely globose, 2.5–3.5 cm in diameter; peduncle 2.5–5 cm long, longer or rarely shorter than the leaves, densely villose. Bracts thinly membranaceous, hyaline at margins, yellowish, 6–11 mm long and 3–6 mm wide, ovate to lanceolate, shortly acuminate, glabrous, only densely ciliate at margins. Calyx creamy with red to purple nerves, sometimes in upper part or on allover red to purple, at first tubular, very soon elliptically or globosely inflated, 9–18 mm long and 4–8 mm wide, with 12–15 parallel nerves, densely appressed pilose; teeth 4–7 mm long. Corolla creamy at claws, limbs pink to purple. Standard 16–21 mm long; limb 10–15 mm long and 5–9 mm wide, oblong-panduriform, often shallowly constricted in lower part; claw broadly cuneate, 5–6 mm long. Wings 15.5–20 mm long; limb 7–10 mm long and 2–3 mm wide, narrowly oblong, obtuse; auricle 0.3–0.7 mm long; claw 8.5–10.5 mm long. Keel 12–15 mm long; limbs 5–6 mm long and ca. 3 mm deep, obovate-triangular, with ± right-angeled lower edge and straight to concave upper edge, obtuse minutely mucronulate; claw 7–9.5 mm long. Stamens with free parts 3–4 mm long. Fruit 7–9 mm long, 1.5–2 mm high and 3–4 mm wide. Seed olive green to red or dark brown, 3.5–4.2 mm long and 2–2.8 mm wide, elliptic, pitted.
Flowering time: (V–)VI–VII.

6a. ***Astragalus hymenocystis*** Fisch. & C.A.Mey. subsp. ***hymenocystis***

Fig. 3 c

Hairs mostly brownish-yellow. Leaflets thick, elliptic to broadly elliptic or obovate, obtuse at tip. Calyx teeth 4–7 mm long, 1/2–1 times of the length of the tube.
Distribution: Known only from NW Iran (mountains N of Uroumieh lake). Map 4.

Specimens seen:

Iran. Prov. W Azerbaijan: ad limites Turciae distr. Khoi, Prov. Atropatanicae, 17.6.1828, *Szovits 544* (LE, G-BOIS, H, L, LE, M, P, W: foto MSB) – In jugo Qushchi inter Shahpur et Rezaiyeh, 1850 m, 13.6.1971, *Rechinger 41884* (W), *Lamond 4098* (W), *Iranshahr 14752* (W).

6b. ***Astragalus hymenocystis*** Fisch. & C.A.Mey. subsp. ***confiniorum*** Zarre & Podlech, **subsp. nov**.
Holotype: Iran, Prov. W Azarbijan, in monte Chalil Kuh prope Razhan, 2600–3200 m, 2.7.1974, *W. Rechinger & Renz 48846a.* (W).

Fig. 3 d

Differt ab subsp. *hymenocystis* indumento e pilis mere albis consistente, foliolis tenuibus, anguste oblongis vel raro anguste obovatis, antice acutis, calyx dentibus longioribus 6-12 mm longis, tubo aequilongis vel ad duplo longioribus.

Hairs pure white. Leaflets thin, narrowly oblong-elliptic, rarely narrowly obovate, mostly acute at tip. Calyx teeth 6–12 mm long, 1–2 times as long as tube.
Distribution: At the border Iran-Turkey. Map 4.

Specimens seen:

Turkey. Prov. Van: Muradiye, 2100 m, steinige Bergsteppe im Tal des Bendimahi-Flusses nordöstlich des Ortes, 17.7.1981, *Raus 4143* (B) – Tendürek Dagh, 2700 m, Spalten und Felsbänder in rötlichen Kalkfelsen am Rande alter Lavafelder am Ostfuß des Vulkans an der Straße Muradiye-Dogubayazit, 17.7.1981, *Raus 4115* (B) – Tendürek Dagh, 2000 m, offene Felssteppe am Ostfuß des Vulkans an der Straße Muradiye-Dogubayazit, 21.7.1981, *Raus 4174* (B).

Iran. Prov. W Azarbijan: In monte Chalil Kuh prope Pesan, 1800–2400 m, 1.7.1974, *Renz 48659* (W) – In monte Chalil Kuh prope Razhan, 2600–3200 m, 2.7.1974, *W. Rechinger & Renz 48846a* and *48846c* (W) – Chalil Kuh: In montibus supra selvana, 1800–2600 m, 4.7.1974, *Renz 48978* (W).

This species is very closely related to *A. lagopodioides*, epecially because some specimens of the latter show the tendency of having somewhat denser inflorescences. In this case fruiting material is easily to determine: *A. hymenocystis* has fruit 7–9 mm long and *A. lagopodioides* 4–5 mm long.

Since the limits between the two taxa are not sharp, and the fact that there are some intermediates between them, we have decided to attribute subspecific level to this new taxon. The presence of yellow hairs is very conspicuous in all of our specimens of subsp. *hymenocystis*, but more material is needed for the conclusion that the character is absolutely reliable. Another interesting difference between the two subspecies is that subsp. *confiniorum* generally growts at higher altitudes than subsp. *hymenocystis*.

7. ***Astragalus hymenostegis*** Fisch. & C.A.Mey., Bull. Soc. Imp. Naturalistes Moscou 26: 448. 1853 ≡ *Tragacantha hymenocystis* (Fisch. & C.A.Mey.) Kuntze, Revis. gen. 2: 945. 1891. **Lectotype** (PODLECH & SYTIN, here designated): ad pagum Seidkhodzi, 20.6.1828, *Szovits 491* (LE!; Iso: G-BOIS!, H!, L!, LE!, M!, MSB!, P!, W!: foto MSB!).

Fig. 4 d

Plants 15–30 cm high. Hairs white, 0.1–1.2 mm, on the peduncle up to 3 mm, on the calyx up to 4 mm long, mostly very thin and straight. Stems from prostrate base ascending, up to 17 cm long, growing 0.5–4 cm per year, in first year 1–3 mm in diameter. Stipules chartaceous, yellowish, not hyaline, with 8–13 parallel nerves at free portion, 7–20 mm long, at a length of 4–10 mm adnate to the petiole, otherwise 1–5 mm connate, from a narrow triangular base lanceolate, acuminate, glabrous, ciliate. Leaves 1–15 cm long; rachides dense, ± thick, rigid, obliquely erect to subhorizontal, densely covered with appressed hairs, later becoming tomentose; petiole (1/7–)1/4–1/3 the length of the rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in (2–)4–8 pairs, ± dense, silver green, flattened or slightly complicated, 4–22 mm long and 1.5–5 mm wide, oblong-elliptic, acute or rarely obtuse, with a mucro up to 2 mm long, both sides densely covered with appressed to subappressed long straight hairs and under them sparely shortly tomentose. Inflorescence overtopping the leaves; flowering part dense, cylindrical, 5–12 cm long and 2.5–3 cm wide (including the bracts); peduncle thick, shorter, as long as or longer as the leaves, 3–16 cm long, densely villose. Bracts glumaceous, thick and rigid, persistent up to fruiting-time, creamy to light brown, sometimes purple at tip, 8–18 mm long and 7–12 mm wide, broadly ovate to rounded at base of inflorescence, elliptic further up, shortly acuminate at tip, densely to sparsely appressed pilose on the whole

surface or only at midrib and apex, ciliate at margins, inside mostly hairy at tip. Bracteoles rarely present, ca. 5 mm long, subulate-lanceolate. Calyx yellow to light brown, sometimes with purple teeth, with 15–20 parallel nerves, at first tubular, soon becoming elliptically inflated, 13–19 mm long and 4–7 mm wide, ± densely long appressed hairy becoming villose; teeth 5–6 mm long. Corolla pale yellow, limbs pink to violet towards margins. Standard 14–16 mm long; limb ca. 10 mm long and 5–8 mm wide, oblong-panduriform, slightly retuse at tip or sometimes minutely mucronulate, sharply hastate at base; claw 6–8 mm long, broadly cuneate. Wings 13–15.5 mm long; limb 6–7 mm long and 2–2.8 mm wide, narrowly oblong, obtuse; auricle 0.3–0.6 mm long; claw 7.3–10 mm long. Keel 12–14 mm long; limbs 5–6 mm long and 2.8–3 mm deep, obovate-elliptic, with broadly curved lower edge and ± convex upper edge, obtuse, sometimes minutely mucronulate; claw 7–9 mm long. Stamens at the upper 3–4 mm free from each other. Fruit 5–7 mm long, 1.5–2.5 mm high and 2.5–3 mm wide. Seeds light to dark brown, ± flattened, 3–4 mm long and 1.5–2.5 mm wide, elliptic to broadly elliptic, pitted.
Flowering and fruiting time: VI–VII.
Distribution: NW Iran, around Uroumieh. Map 5.

Specimens seen:

Iran. Prov. W. Azarbaijan: Ad pagum Seidkhodzi, 20.6.1828, *Szovits 491* (G-BOIS, H, L, LE, M, MSB, P, W) – Rezayeh, hill by the lake just N of Golman Khaneh, 1400 m, 1.6.1974, *Wendelbo et al. 11985* (LE, W) – In declivibus borealibus jugi Qushchi inter Shahpur et Rezaieh, 1700 m, 21.7.1974, *Rechinger 49804* (W) – N des Dorfes Mahmudan, zwischen Sero und Shahpur, 1600–1700 m, 8.7.1972, *Renz* (W) – Shahpur to Rezaieh, Avgan (montis), 1500–2000 m, 17.6.1970, *Termeh 14605* (W).

The very broad and thickly textured bracts of *A. hymenostegis* make it easy to recognize. But *A. tabrizianus*, another frequent species in the region, sometimes has the same bracts. In this case the relative size of inflorescence to leaves can be useful: *A. tabrizianus* has the inflorescence shorter than leaves, and in *A. hymenostegis* they are overtopping the leaves. The venation of the bracts is very peculiar in *A. hymenostegis*, i.e. the ends of the nerves are anastomose in contrast to all other species, in which they end parallely. However this character is sometimes very difficult to observe. Moreover we had too little material to be absolutely sure about the applicability of it. Therefore this character was not useful in the description and key. The bracts of this species are hairy inside; a character which can be observed in few other species of the section, namely: *A. tabrizianus, A. lagopoides* (not always) and *A. persicus* (rarely).

8. ***Astragalus kohrudicus*** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 67. 1868, et l.c. 15(1): 109. 1869 ≡ *Tragacantha kohrudica* (Bunge) Kuntze, Revis. Gen. 2: 60. 1891. **Holotype**: prope Sof [et Kohrud], 13.5.1859, *Bunge & Bienert* (P!) (specimen unicum quod mihi [BUNGE] redol.)
= *A. thyrsiflorus* Sirj. & Rech.f., Repert. Spec. Nov. Regni Veg. 48: 121. 1940. Holotype: Iran, Keredj, bei Khur und Pashand, 3.6.1937, *Rechinger 674* (W!: foto MSB!; Iso: K!, ZT!).

Fig. 1 b

Plants 15–30 cm high. Hairs 0.1–3 mm, on calyx up to 6 mm long, mostly straight. Stems prostrate to ascending, up to 15 cm long, growing 1–4 cm per year, in first year

1–4 mm in diameter. Stipules chartaceous, yellow to whitish, with 3–5 parallel nerves at free portion, 9–15 mm long, at a length of 4–8 mm adnate to the petiole, otherwise 2–5 mm connate, from triangular base lanceolate, acuminate, glabrous or only at margins ciliate. Leaves 1.5–14 cm long; rachides dense, thick, rigid, obliquely erect or incurved, sparsely covered with shortly appressed or spreading hairs and between them with some longer subappressed ones; petiole 1/10–1/4 the length of the rachid; end-thorn 1/4–1/1 the length of the uppermost leaflets; leaflets in 3–9 pairs, green, remote, 5–26 mm long and 0.5–3 mm wide, complicated or rarely flattened, linear to narrowly oblong-elliptic, acute, with a mucro up to 2.5 mm long, both sides sparsely covered with shortly appressed to subappressed hairs, lower surface often with some patent hairs too. Inflorescence mostly sessile, dense, flowering part 5–15 cm long and 3.5–4.5 cm in diameter, shorter than the leaves, at first ovate, becoming cylindrical; peduncle 0–1.5 cm long, densely villose. Bracts thickly membranaceous, not hyaline, yellowish, purple or brown at tip (at first green), 7–20 mm long and 4–8 mm wide, broadly ovate at the base to lanceolate-elliptic towards the top of inflorescence, acute or shortly acuminate, glabrous, younger ones sparsely ciliate. Calyx creamy, towards the teeth purple, at first tubular, soon becoming inflated, 18–27 mm long and 5–14 mm wide, globose to broadly elliptic, with 20–30 parallel nerves, densely long appressed hairy becoming densely to sparsely villose; teeth 8–10 mm long. Corolla pale yellow at claws, limbs pink to dark purple (brown when dried). Standard 20–31 mm long; limb 11–18 mm long and 7–11 mm wide, elliptic-panduriform, shortly acuminate or rarely rounded at the apex, hastate-auriculate at base; claw 9–13 mm long, ± broadly cuneate. Wings 19–28 mm long; limb 8–13 mm long and 2.5–3 mm wide, narrowly oblong, obtuse; auricle 0.4–1.2, mm long; claw 12.5–16.5 mm long. Keel 19–26 mm long; limbs 7–10 mm long and 3.5–4 mm wide, elliptic, with slightly curved lower edge and concave upper edge, obtuse, minutely mucronulate; auricle distinct; claw 12–16 mm long. Stamens at the upper 5–6 mm free from each other. Fruit 6–11 mm long, 1.5–2 mm high and 3–4 mm wide. Seeds light to dark brown, ca. 4 mm long and 2.5 mm wide, elliptic-reniform, flattened, pitted.
Flowering and fruiting time: V–VI.
Distribution: Iran: Zagros and Elburz ranges. Map 4.

Specimens seen:

Iran. Prov. Tehran: Baragan (westl. von Keredj), 17.6.1934, *Gauba 4* (B) – 81 km W of Karaj, Behjatabad, 1680 m, 28.6.1972, *Foroughian & Hariri 15929* (W) – In ditione oppidi Keredj, in collibus prope Khur und Pashand, 3.6.1937, *Rechinger 674* (K, W, ZT) – 42 km W of Karaj, 1510 m, 25.6.1972, *Foroughian 16031* (W) – 35 km NW of Karaj, Valian, 1790 m, 24.6.1972, *Foroughian 15839* (W) – Sorkhe-hesar, Haraz road, 1530 m, 3.6.1974, *Foroughi et al. 12468* (W) – Sorkhe Hesar NE Tehran, 1400 m, 18.6.1974, *Amin & Bazargan 19018* (W). – Prov. Zanjan: Ghazvin to Zanjan, 25 km to Ghazvin, 29.6.1971, *Termeh 40783-E* (W) – Kordan inter Keredj et Kazvin, *Gauba 566* (W). – Prov. Esfahan: prope Ssof, inter Isfahan et Teheran, V.1859, *Bunge* (*& Bienert*) (P).

The species is closely related to *A. glumaceous*. Both of them are characterized by large flowers. *A. kohrudicus* has a smaller distribution area, which is limited to northern cental Iran.

Shortly acuminate to acute bracts and narrower leaflets, which are mostly complicate are the characters which make separation of *A. kohrudicus* from *A. glumaceous* easy.

9. ***Astragalus lagopodioides*** Vahl, Symb. Bot. 1: 64. 1790. ≡ *Astragalus lagopoides* Lam. var. *β*, Encycl. Méth. Bot. 1: 322. 1783. **Lectotype** (designated here): 'Tragacantha orientalis vesicaria, floribus purpureis in capitulum pedunculo donatum congestis', *Tournefort* cor. 30 (P-TOURNEFORT!; Iso: B-WILLD 14086/2!, H!).
= *A. zohrabi* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 68. 1868 et l.c. 15(1): 112. 1869 ≡ *Tragacantha zohrabi* (Bunge) Kuntze, Revis. gen. 2: 949. 1891. Syntypes: Armenia prope Baibut. *Bourgeau 69*; dto., *Zohrab* (K). Lectotype (here designated): Armenia prope Baibut. *Bourgeau 69* (P!; Iso: G!, M!, W!)
= *A. splendens* Sirj. & Rech. f., Symb. Bot. Upsal. 11(5): 21. 1952. illeg. [non (Dougl.) Tidest. 1937]. Holotype: Kerikas Dere, 5 km SW Arpat, 24 km SW Gevas (Vastan), 2400 m, 26.6.1939, *Frödin 295* (W!)

Figures: WILLDENOW, Mém. Acad. Roy. Sci. Hist.(Berlin): tab. 1, fig. 4. 1794.
Fig. 3 b

Plants 10–15 cm high, up to 25 cm including inflorescence. Hairs 0.1–1.5 mm, on peduncle up to 3 mm and on calyx up to 4.5 mm long, crispate or straight. Stems ascending, up to 15 cm long, growing 1–5 cm per year, at first year 1–3 mm in diameter. Stipules thinly membranaceous, hyaline at free portion, yellowish white, with 3–8 parallel nerves at free portion, 6–16 mm long, at a length of 3–9 mm adnate to the petiole, otherwise 0.5–2 mm connate, from a triangular base lanceolate, acute or acuminate, ciliate, otherwise glabrous. Leaves 0.7–5 cm long; rachides very dense, thin, flexible, mostly curved, obliquely erect to horizontal, lower ones deflexed, densely or sparsely spreading hairy; petiole 1/4–1/2 the length of the rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in 3–6(–8) pairs, dense, grey green, weakly complicate to flattened, 3–14 mm long and 1–2.5 mm wide, linear to narrowly elliptic, acute, with a mucro 0.2–1 mm long, both sides densely covered with appressed to subappressed hairs. Inflorescence overtopping the leaves; flowering part loose, 3–9 cm long and 3–3.5 cm in diameter, globose to cylindrical; peduncle longer or rarely shorter than the leaves, 2–9 cm long, densely villose, later on glabrescent. Bracts thinly membranaceous, hyaline at margins, yellowish or purple (especially at tip), 8–15 cm long and 2.5–6 mm wide, broadly ovate to lanceolate-elliptic, acuminate, wholly glabrous or at apex and midrib sparsely pilose. Bracteoles rarely present, mostly single, 4–6 mm long, subulate-lanceolate, ciliate. Calyx creamy, red to purple in upper part or entirely, before anthesis tubular, soon globosely to elliptically inflated, 10–18 mm long and 3–7 mm wide, with 12–17 parallel nerves, densely covered with appressed to subappressed long hairs becoming sparsely villose; teeth 4–12 mm long. Corolla limb pink or mauve towards margins. Standard 15–22 mm long; limb 10–17 mm long and 5–8 mm wide, oblong-panduriform, shallowly constricted at lower third, retuse at tip, sometimes minutely mucronulate, hastate-angulate at the base; claw 4–5 mm long, broadly cuneate. Wings 14–19 mm long; limbs 6–9 mm long and 1.5–3 mm wide, narrowly oblong, sometimes somewhat enlarged towards the apex, obtuse; auricle 0.3–0.6 mm long; claw 7.5–9.5 mm long. Keel 12–15 mm long; limbs 5–6 mm long and 2.5–3 mm deeep, triangular-obovate, obtuse, minutely mucronulate; claw 7–9.5 mm long. Stamens at the upper 3–4 mm free from each other. Fruit 4–5 mm long, 1.5–2 mm high and 2.5–3 mm wide. Seeds olive green to dark brown, 2.5–3.5 mm long and 2–2.5 mm wide, broadly elliptic to almost rounded, pitted.
Flowering and fruiting time: VI–VIII.
Distribution: E Turkey. Map 5.

Specimens seen:

Turkey. Prov.Erzurum: Armenia prope Baibut, *Bourgeau 69* (G, M, P, W) – Oltu, 5 km W Sihsor, 1800 m, 26.6.1988, *Nydegger 43485* (MSB) – Gümüsane, Bayburt to Askale, nahe Bayburt, 1650 m, 21.8.1987, *Engel 156* (MSB) – 2 km N Bayburt, 1380 m, 12.6.1988, *Nydegger 43317* (MSB). – Prov. Gevas: Kerikas Dere, 5 km SW Arpat, 24 km SW Gevas (Vastan), 2400 m, 26.6.1939, *Frödin 295* (W!). – Prov. Van: distr. Gevas: Artos Dag., 14.7.1954, *Davis & Polunin 22733* (M) – N-seite des Artos dagi, unmittelbar S der Stadt Gevas, 2000–2200 m, 22.7.1978, *Ehrendorfer et al. 787-93-11* (MSB) – Pelli dag, between Van and Tatvan, 2000–2500 m, 29.6.1968, *Rix et al. 728* (M) – In summo jugi inter Bashkale et Hoshap, 2700 m, 30.6.1975, *Rechinger 1975* (W) – Slopes above Ereek golu, 1800 m, 10.6.1985, *Archibald 6627* (M) – Gürpinar to Baskale; Güzeldere Gecidi, 2900 m, 12.8.1987, *Engel 118* (MSB) – Van to Catak, 8 km nach Kiziltas, 2150 m, 13.8.1987, *Engel 125* (MSB). – Not to localize: In Armenia, *Aucher 2439* (W).

Because of having lax inflorescence the species is located in the same group with *A. sciureus, A. paralurges* and *A. rubrostriatus*. However in *A. lagopdioides* the limbs both of standard and wings are long in comparison to the claw, this character connect it to the group *A. hymenocystis* and *A. uraniolimneus*. Some forms of *A. lagopodioides* may have a somewhat denser inflorescence. These forms can be confused with *A. uraniolimneus*. However in such a case characters of the rachides must be used to recognize the specimens definitively. See also the note under *A. uraniolimneus*.

The record of *A zohrabi* (see the synonyms) from Iran (MAASSOUMI 1995) is surely a mistake. Unfortunately we have not seen any of material cited as *A. zohrabi* by Maasoumi. However we had a large collection from the region around Uroumieh, and none of our plants can be attributed to *A. lagopodioides*.

10. ***Astragalus lagopoides*** Lam., Enycl. Méth. Bot. 1: 322. 1783 ≡ *A. lagurus* Willd., Mém. Acad. Roy. Sci. Hist. (Berlin) 1794–1795: 28. 1794 ≡ *Tragacantha lagopoides* (Lam.) Kuntze, Revis. Gen. 2: 945. 1891 ≡ *Tragacantha lagurus* (Willd.) Kuntze, Revis. Gen. 2: 945. 1891. **Typus**: 'Tragacantha orientalis, floribus luteis in capitulum longe pediculo donatum congestis', *Tournefort* cor. 30 (B-WILLD 14087!: as *A. lagurus* Willd., G-DC!, M!)

= *A. lagurus* Willd. var. *brachypodus* (Boiss.) Boiss., Fl. Or. 2: 385. 1872 ≡ *A. brachypodus* Boiss., Diagn. Pl. Or. Nov. 2: 69. 1843 ≡ *Tragacantha brachypodia* (Boiss.) Kuntze, Revis. Gen.: 943. 1891. Syntypes: In Persia, *Aucher 3835* (G!); *1359bis*. Lectotype (here designated): In Persia, *Aucher 1359bis* (G-BOIS!; Iso: K!)

= *A. lagurus* Willd. var. *flavus* Trautv., Trudy Imp. S.-Petersburgsk. Bot. Sada 4: 129. 1876. Typus: Turcia distr. Erzerum, in itinere Chnis-Kala versus, *Radde* (E!)

= *A. karsianus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 15(1): 115. 1869 ≡ *Tragacantha karsiana* (Bunge) Kuntze, Revis. Gen. 2: 945. 1891. Holotype: Armenia prope Kars, VII.1867, *Radde 280* (P!, Iso: LE!)

Figures: WILLDENOW, Mém. Acad. Roy. Sci. Hist.(Berlin): tab. 2, fig. 2. 1794; PALLAS, Species Astragalorum : tab. XVI. 1800; De CANDOLLE, Astragalogia: tab. 36. 1802.
Fig. 4 c

Plants 10–30 high, up to 50 cm including inflorescence. Hairs white, 0.1–1.5 mm, on the peduncle up to 2.5 mm, and on the calyx up to (3–)4 mm long, mostly very

thin. Stems ascending, up to 20 cm long, growing 1–6 cm per year, in first year 1–3.5 mm in diameter. Stipules chartaceous, yellowish white, not hyaline, with 5–7 parallel nerves at free portion, 12–30 mm long, at a length of 6–20 mm adnate to the petiole, otherwise 3–6 mm connate, free portions triangular, acuminate, younger ones sparsely appressed pilose, becoming glabrous, ciliate. Leaves 1.5–15 cm long; rachides ± dense, thick, rigid, mostly straight or rarely recurved, obliquely erect to subhorizontal, older ones sometimes deflexed, densely covered with appressed to subappressed straight hairs; petiole 1/4–1/3 the length of the rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in 4–8 pairs, ± remote, silvery-green, mostly flattened or weakly complicate, 7–26 mm long and 1.5–6 mm wide, narrowly oblong to oblong, acute, with a mucro up to 2.5 mm long, both sides densely sericeous hairy or lower side with some subappressed hairs on the midrib. Inflorescence overtopping the leaves, very rarely shorter than leaves; flowering part dense, ovate to cylindrical, rarely globose, 3–10 cm long and 2.5–3.5 cm wide (including bracts up to 4 cm wide); peduncle thick, shorter, as long as or longer than the leaves, (1–)3–30 cm long, densely covered with short appressed hairs up to 1.5 mm long and between them some subappressed thicker ones up to 2.5 mm long. Bracts glumaceous, persistent up to fruiting-time, yellow to creamy, sometimes red at extreme tip, 14–23 mm long and 3.5–8 mm wide, elliptic to narrowly elliptic, rarely ovate, very long acuminate, densely to sparsely appressed pilose, glabrescent except for the tip and midrib. Bracteoles rarely present, whitish, ca. 4 mm long, linear-spathulate, sparsely villose. Calyx yellow to light brown, sometimes with purple teeth, with 15–20 parallel nerves, at first tubular, soon becoming elliptically inflated, 13–19 mm long and 4–7 mm wide, ± densely long appressed hairy becoming villose; teeth 5–6 mm long. Corolla limb yellowish, red to dark purple. Standard 14–16 mm long, rarely sparsely appressed shortly hairy on dorsal side; limb 7–11 mm long and 4–8 mm wide, oblong-panduriform, retuse at tip or sometimes minutely mucronulate, acutely hastate at base; claw 6–7 mm long, broadly cuneate. Wings 13–16.5 mm long; limbs 5–7 mm long and 1.5–3 mm wide, narrowly oblong, obtuse; auricle 0.3–0.8 mm long; claw 8.5–10 mm long. Keel 12–14 mm long; limbs 5–6 mm long and 2.8–3 mm deep, obovate-elliptic, with broadly curved lower edge and ± convex upper edge, obtuse, sometimes minutely mucronulate; claw 7–9 mm long. Stamens at upper 3–4 mm free from each other. Fruit 5–7 mm long, 1.5–2.5 mm high and 2.5–3 mm wide. Seeds light to dark brown, ± flattened, 3–4 mm long and 1.5–2.5 mm wide, elliptic to broadly elliptic, pitted.
Flowering- and fruiting-time: VII–IX.
Distribution: E Turkey, Armenia, Azerbeidzhan, NW Iran. Map 10.

Specimens seen:

Turkey. Prov. Nevsehir: Ürgüp-Develi, Topuzdagi Gecidi, 21.7.1992, 1550 m, *Nydegger 46830* (MSB). – Prov. Kayseri: Cappadocia, Ali Dagh, a 7 km SE de Cesaree (Cappadoce), 1400 m, VII./VIII.1856, *Balansa 943* (G-BOIS, MSB, W, ZT) – Ali dagi, SÖ Kayseri, Osthang oberhalb Resadiye Köyü, 1350–1800 m, 8.7.1969, *Buttler 13894* (M). – Prov. Sivas: beim Dorf Hyouk und vom Haly, Akdagh, 1600 m, VI.1911, *Siehe 365* (W). – Prov. Bayburt: In collibus ad Dudezard, prope Baibut, 28.7.1862, *Bourgeau 74* (B, C, G-BOIS, M, W, ZT). – Prov. Erzurum: circa Erzeroum, VII.1853, *Huet Du Pavillon 169* (G-BOIS, W, ZT). – Prov. Agri: Armenia prope Kars, VII.1867, *Radde 280* (P, LE) – Chorasan, am Paß Velibaba Gedik in etwa 2500 m, 4.8.1962, *Höpflinger* (C, W) – In jugo inter Agri (Karaköse) et Horasan, 2000–2500 m, 3.8.1965, *Rechinger 32805* (M, W) – inter Agri et Horasan, 45 km W Agri, 4.–5.1957, *Rechinger 14991* (W) – 12 km N of Zara, 1700 m, 12.7.1971, *Andersen et al. 2200* (C) – Prope Dogubayazit, c. 2000 m, 4.–5.9.1957, *Rechinger 14972* (W) – Aufstieg zum Ararat, S Dogubayazit, Ganikor, Ibrahim Karo, Camp III, Araratgipfelzone, 2400 m, 13.–17.8.1969, *Albertshofer & Schauer* (M). – Prov. Urfa: Siverek, 15 km to Karabahce, 1800 m,

20.6.1984, *Gönül Kaynak K16* (B). – Prov. Bitlis: 56 km E Kücüksu (= Kotum), 2 km W unterhalb des Kuzgunkiran-Passes, 2050 m, 21.7.1978, *Ehrendorfer et al. 787-89-6* (WU) – Bitlis, Hanemir Dag, von Oboskü Köyü aus, 2400 m, 10.8.1987, *Engel 109* (MSB) – Nemrud Dag, 2600 m, 9.8.1987, *Engel 99* (MSB). – Prov Van: Ercis to Delicay, weiter nach Pay Köyü, 14.8.1987, *Engel 131* (MSB). – Not lo localize: Cappadoce or., 1834, *Aucher 2327* (W).

Armenia. Distr. Ashtarak, in declivibus montis Arailer, in vicinitate pagi Egvart, 1300–1900 m, 15.7.1975, *Vasak* (B, M) – On road from Erevan to Sevan Lake, c. 20 km N Erevan, 3.8.1984, *McNeal et al. 369* (C) – Lacus Gokcza, 6.8.1929, *Fomin* (C, ZT) – dto., 6.9.1912, *Rübel 13144* (ZT) – Distr. Ararat, montes Gegamski Khrebet, loco Khach-Karer, 1700–1900 m, 9.7.1975, *Vasak* (B, M, W) – Montes Gegamski Khrebet, in vicinitate ruinarum pagi Akhkeng, 1800–2100 m, 10.7.1975, *Vasak* (B, M, W) – Distr. Abovyan, montes Gegamski Khrebet, in clivis montis Hadis, in vicinitate pagi Zar, 1700–2000 m, 14.7.1975, *Vasak* (M).

Azerbeidzhan. Nachitschewan: pr. Khoshadara in Prov. Nachitschewan, 3.7.1829, *Szovits 468* (B, G-BOIS, LE, M, W, ZT) – Prope pagum Beczenag, distr. Nachiczevan, 4.7.1901, *Fomin 451* (B, LE) – dito, V.1847, *Buhse 351* (G-BOIS, LE).

Iran. Prov. W Azarbaijan: distr. Khoi, 17.7.1828, *Szovits 546* (G-BOIS, LE, M, W, ZT) – Maku, Kouhe Ghadjeh Dagh, 2100–2250 m, 10.8.1971, *Termeh 40876* (W) – In monte Ghogeh Dagh W Bazorgan ad confines Turciae, 2100–2250 m, 1.8.1971, *W. Rechinger 43996* (W) – Kuh Kani Ziarat N Habashi Bala prope Qotur, 2300–3000 m, 18.7.1974, *W. Rechinger & Renz 49643, 49644* (W) – In jugo inter Oshnovieh et Ziveh, 2000–2200 m, 14.7.1974, *Rechinger 49378* (W). – Prov. E Azarbaijan: inter Sofian et Marand, 6.1859, *Bunge* (G-BOIS) – Qara Dagh, in monte Kiyamaki Dagh (Kamcheh) prope Daran SE Jolfa, 1400–2400 m, 26.7.1971, *Termeh 43787, 41020* (W) – In jugo inter Marand et Sufian, 1600–1750 m, 6.6.1971, *Rechinger 41250* (W). – Not exactly to localize: Armenia, *Aucher 1245* (G-BOIS, LE, W).

Specimens with globose inflorescence shorter than the leaves:

Turkey. Prov. Van: Ercis to Delicay, weiter nach Pay Köyü, 2150 m, 14.8.1987, *Engel 127* (MSB).

Armenia. Steppe um Isardar-Bulagh bei Ararat, c. 2500 m, 1.9.1912, *Rikli* (ZT).

This oldest described species of the section has been named for a long time as *A. lagurus* by mistake. The very long acuminate bracts are the most characteristic feature of the species, and it is mostly very easy to identify. The forms of the species with short peduncles (*A. brachypodus* ≡ *A. lagurus* var. *brachypodus*) can be confused with *A. tabrizianus* or *A. velenowskyi*. They are distinguishable from *A. tabrizianus* by following characters:

– The corolla of *A. tabrizianus* is always red to purple, that of *A. lagopoides* whitish-yellow or purple. All specimens with short peduncles of *A. lagopoides* have yellow corolla.
– The bracts of *A. tabrizianus* are mostly shortly acuminate in contrast to *A. lagopoides* with long acuminate bracts.
– The calyx of *A. tabrizianus* become inflated soon after anthesis, but that of *A. lagopoides* much later.
– Bracts of *A. tabrizianus* are caducous, but persistent in *A. lagopoides*.
See also the notes about *A. persicus*.

11. *Astragalus laguriformis* Freyn, Bull. Herb. Boiss. 5: 602. 1897 ≡ *A. laguroides* Freyn non Pall. nom. illeg., Bull. Herb. Boiss. 3: 180. 1895. **Holotype**: [Iraq] Kurdistania, in montis Kuh-Sefin reg. infer. ad pag. Schaklava (ditionis Erbil), 1000 m, 4.6.1893, *Bornmüller 1194* (BRNM!; Iso: B!: foto MSB!, JE!: erronnee *1094*, W!).

= *A. wanensis* (Bornm.) ex Rech. f., Dulfer & Patzak, Sirjaevii fragmenta Astragalogica. V. Sect. *Hymenostegis*. – Sitzungsber. Österr. Akad. Wiss. Math.-Naturwiss. Kl., Abt. 1, Biol. 168/2: 107, 113. 1959. Lectotype (designated here): Turkey, Kurdistania turcica: In aridis ad lacum Wan, 2500 m, 12.6.1899, *Kronenburg* (WU!).
= *A. trifoliastrum* Hub.-Mor. & V.A.Matthews, Notes Roy. Bot. Gard. Edinburgh 29: 301. 1969. Holotype: Turkey, B9 Van, Van-Hosap, 20 km N Van, 1950 m, 8.7.1951, *Renz & Simon* in hb. HUBER-MORATH *11467* (G!).

Figures: TOWNSEND, Fl. Iraq 3: 374, pl. 60. 1974.
Fig. 5 d

Plants 10–25 cm high. Hairs 0.3–1 mm, on peduncle up to 2.5 mm, on calyx up to 5 mm long, mostly thin, straight, the shorter ones inflated at the base. Stems from a prostrate base ascending, up to 20 cm long, growing 1–7 cm per year, in first year 1–3 mm in diameter. Stipules chartaceous, yellowish, not hyaline, with 1–3 parallel nerves at free portion, 5–12 mm long, at a length of 3–8 mm adnate to the petiole, otherwise 1–4 mm connate, free portions from a triangular base acuminate, younger ones sparsely appressed pilose becoming glabrous, ciliate. Leaves 0.7–7.5 cm long; rachides remote, rigid, thick, straight, oblique patent, densely appressed hairy becoming glabrous; petiole ca. 1/3 the length of the rachid; end-thorn ca. 1/2 the length of the uppermost leaflets; leaflets in 1–3(–4) pairs, remote, silvery-green becoming yellowish green with age, 7–20 mm long and 2–3.5 mm wide, narrowly oblong, flattened, acute, with a mucro up to 3 mm long, both sides densely sericeous. Inflorescence shorter or as high as the leaves; flowering part ± dense, globose to ovate, 2–5 cm long and 2.5–3 mm wide; peduncle 1–3 cm long, densely long appressed hairy. Bracts thickly membranaceous, not hyaline, yellowish, turning to red at extreme tip, 13–22 mm long and 4–8 mm wide, broadly ovate to lanceolate-elliptic, very long acuminate, sparsely shortly appressed pilose especially on midrib and at tip. Calyx whitish to creamy, with red teeth, at first tubular, soon oblong-elliptically inflated, 14–18 mm long and 5–7 mm wide, with 17–22 parallel nerves, densely long appressed hairy later on glabrescent; teeth 5–7 mm long. Corolla limb red to purple. Standard 15–19 mm long; limb 9–12 mm long and 6–7 mm wide, oblong-panduriform, retuse at tip, minutely mucronulate, hastate at base; claw 6–7 mm long, broadly cuneate. Wings 14–17 mm long; limbs 6–7 mm long and 2–3 mm wide, narrowly oblong, obtuse; auricle 0.4–0.7 mm long; claw 8.5–10.5 mm long. Keel 12–14 mm long; limbs c. 5 mm long and 3 mm deep, obovate-oblong, with almost rectangular bent lower edge and ± convex upper edge, obtuse, often minutely mucronulate; claw 7–10 mm long. Stamens at upper 3–4 mm free from each other. Fruit and seeds unknown.
Distribution: E Turkey and NE Iraq. Map 6.

Specimens seen:

Turkey. Prov. Van: Van-Hosap, 20 km N Van, 1950 m, 8.7.1951, *Renz & Simon 11467* in hb. HUBER-MORATH (G) – Kurdistania turcica: In aridis ad lacum Wan, 2500 m, 12.6. 1899, *Kronenburg* (WU)

Iraq. Rowanduz District (MRO): Kurdistania, in montis Kuh-Sefin reg. infer. ad pag. Schaklava (ditioinis Erbil), 1000 m, 4.6.1893, *Bornmüller 1194* (BRNM, B: foto MSB, JE: erronnee *1094*, W).

This species is cosely related to *A. hirticalyx*. It differs from all other species with short peduncles in having only 1–3(–4) pairs of leaflets per leaf Although in other species of the section some specimens can be found, whose leaves are few-paired too, but in these specimens such leaves are very rare, while in *A. laguriformis* leaves with

4 pairs of leaflets are very rare. The internodes of *A. laguriformis* are also somewhat longer in comparison with other species of the subsect. *Hymenostegis*.

We can not confirm the occurence of *A. laguriformis* in Iran (MAASSOUMI 1995). The specimens cited by MAASSOUMI as *A. laguriformis* belong most probably to *A. tabrizianus*.

12. ***Astragalus nervistipulus*** Boiss., Fl. Or. 2: 384. 1872. **Lectotype** (here designated): In monte Pir Omar Gudrun Kurdistaniae, VI.1867, *Haussknecht 333* (G-BOIS!; Iso: G-BOIS!, JE!, MSB!, W!).

= *A. brunsianus* Bornm., Beih. Bot. Centralbl. 33(2): 284. 1915. Holotype: Teheran, hinter Deschon-tepe, 10.5.1909, *Bruns* (B!: foto MSB!; Iso: HBG!).

= *A.chrysostachys* Boiss. var. *dolichourus* Sirj. & Rech.f., Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 1955: 109. 1955. Lectotype (here designated): Kuh-Tscha-Siah bei Siwend, 16.7.1885, *Stapf 1073* (WU!; Iso: B!: foto MSB!, WU!).

Fig. 2 b

Plants 15–40 cm high. Hairs 0.3–1.5 mm, on peduncle up to (2–)3.5 mm and on the calyx up to (4.5–)6 mm long, thin. Stems mostly from a prostrate base ascending, up to 20 cm long, growing 0.5–4 cm per year, in first year 1.5–4 mm in diameter. Stipules thinly membranaceous, ± hyaline, whitish with yellow nerves, with 3–8 parallel nerves at free portion, 8–27 mm long, at a length of (3–)4–15 mm adnate to the petiole, otherwise 2–9 mm connate, triangular, acute, glabrous, sparsely ciliate at margins. Leaves 1.5–16 cm long; rachides ± remote, rigid, thick, straight or incurved, obliquely erect to subhorizontal, rarely deflexed, densely covered with appressed to subappressed hairs, later on glabrescent; petiole 1/5–1/3 the length of the rachid; end-thorn 1/10–1/2 the length of the uppermost leaflets; leaflets in 3–8 pairs, greyish green, ± remote, 6–27 mm long and 1.5–4 mm wide, mostly flattened, linear to narrowly oblong, acute, with a mucro up to 1.5 mm long, both sides densely sericeous. Inflorescence overtopping the leaves; flowering part dense, 7–12 cm long and 3–4 cm in diameter, cylindrical; peduncle mostly very thick, 7–11 cm long, ± as long as the leaves, densely covered with short appressed hairs up to 1.5 mm long and between them some subappressed thicker ones up to 3.5 mm long. Bracts easily falling, thickly membranaceous, not hyaline or only so at margins, yellowish, sometimes with purple tip, 13–18 mm long and 3–8 mm wide, broadly ovate at the base of the inflorescence to lanceolate-elliptic further up, shortly acuminate, glabrous, ciliate. Calyx pale yellow or creamy with purple teeth, younger ones in upper part or as whole purple, 16–23 mm long, 4–7 mm wide, at first tubular, soon becoming elliptically inflated, with 17–22 parallel nerves, sparsely villose; teeth 8–12 mm long. Corolla limb pink, sometimes purple towards margins. Standard 17–24 mm long; limb 12–16 mm long and 6.5–8 mm wide, oblong-panduriform, rounded at the apex, sometimes minutely mucronulate, hastate-auriculate at base; claw 5–8 mm long, broadly cuneate. Wings 15.5–22 mm long; limbs 8–11 mm long and ca. 3 mm wide, narrowly oblong, obtuse; auricle 0.3–1 mm long; claw 8–12 mm long. Keel 14–18 mm long; limbs 5–6 mm long and ca. 3 mm deep, obovate-triangular to oblong, with ± rectangular bent lower edge and straight upper edge, obtuse, minutely mucronulate; claw 9–12 mm long. Stamens at upper 4–5 mm free from each other. Fruit 7–8 mm long, 1.5–2.2 mm high and 3–4 mm wide. Seeds olive green to light brown, 4–4.5 mm long and ca. 3 mm wide, elliptic, ± flattened, nearly smooth.

Flowering and fruiting time: V–VII.

Distribution: NE Iraq, W Iran. Map 5.

Specimens seen:

Iraq. Rowanduz Distr. (MRO): In monte Pir Omar Gudrun Kurdistaniae, VI.1867, *Hausskneht 333* (G-BOIS, JE, MSB, W) – (Assyria orient.): In montis Kuh-Sefin (ditionis Erbil), 1100–1200 m, 2.5.1893. *Bornmüller 1177* (B, MSB, W) and *1177b* (B) – Kurdestania, Riwandous ad fines Pers., in monte Hanoaru, 1300 m, 28.7.1893, *Bornmüller 1178* (B).

Iran. Prov. Tehran: Teheran, hinter Deschon-tepe, 10.5.1909, *Bruns* (B). – Prov. Kordestan: Sanandaj/Marivan, 16.6.1956, *Sabeti 21* (W) – In quercetis 90–110 km W Sanandaj versus Marivan (Dezh Shahpur), 1650–1800 m, 6.7.1971, *Rechinger 42914* (W) – 95 km from Marivan to Sanandaj, 1700 m, 5.7.1971, *Termeh 40929* (W) – 75 km NW of Sanandaj towardss Marivan, 1830 m, 18.5.1966, *Archibald 2030* (W) – Sanandaj to Marivan, Pass Ariz 25 km from Sanandaj, 2200–2350 m, 3.7.1971, *Termeh 41025* (W) – In jugo Ariz 20 km W Sanandaj, 2200 m, 4.7.1971, *Rechinger 42861* (W) – dto., *Lamond 4505* (M) – 15 km from Sanandaj on the road to Saghez, 1500 m, 7.7.1994, *Chehregani & Zarre 17854* (M, TARI, TUH) – Sanandaj, Areman, 20.5.??, *Sharif 5238* (W) – Sanandaj, 1700–2000 m, 26.5.1963, *Jacobs 6702* (BG, W) – Inter Kermanshah et Sanandaj, 120 km NNW Taqi Bustan, 29.8.1957, *Rechinger 14702* (W) – C. 100 km N of Kermanshah by the last pass before Sanandaj, 1700 m, 12.6.1959, *Wendelbo 1948* (BG, LE) – 86 km N of Kermanshah, inter Kermanshah et Sanadaj, 19.5.1960, *Bent & Wright 519-604* (W). – Prov. Kermanshah: mons Ghaladjeh, 2000 m, 15.5.1948, *Behbudi 155* (W). – Prov. Hamadan: Razan to Avaj, 10 km to Avaj, on the neck, 2200–2300 m, 10.7.1994, *Chehregani & Zarre 17883* (MSB, TARI, TUH). – Prov. Fars: Kuh-Tscha-Siah bei Siwend, 16.7.1885, *Stapf 1073* (WU, B).

Long calyx teeth and long hairs on the calyx characterize this species. The flowers are also relatively larger than in other species of the group. Like in *A. chrysostachys* the bracts fall very quickly. In some specimens of *A. nervistipulus* it is difficult to recognize the colour of the corolla after drying. Such specimens can be confused with *A. chrysostachys*, because the stipules of the latter are also thinly membranaceous and hyaline. In this case the long hairs on the calyx and long calyx teeth can lead to correct determination.

This species is remarkably disjunct: Beside the continuous area there is only one specimen known from mountains near Tehran, which has been described as *A. brunsianus*, and only one specimen known from Prov. Fars, which has been described as *A. chrysostachys* subsp. *dolichochorus*. The nearest locality from the collecting site near Tehran is Avaj in Prov. Hamadan, which is 200 km away. Between these two localities there are few high mountains, which are suitable for the growth of the species. Possibly if this region would be collected more intensively, the species could be found here, too. The same is true for the specimens from Prov. Fars. Here the region between Prov. Kermanshah and Prov. Fars, including Prov. Ilam and Prov. Kohgiluyeh is undercollected up to now.

13. *Astragalus paralurges* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 67. 1868 et l.c. 15(1): 111. 1869. **Holotype**: Persia bor., inter Chorum-derreh et Sultanieh, 6.6.1859, *Bunge & Bienert* (P!; Iso: G-BOIS!).

Fig. 3 a

Plants 5–10 cm high, up to 20 cm including inflorescence. Hairs 0.1–0.8 mm, on the peduncle up to 2(–3) mm, on the calyx up to 5 mm long, mostly strongly appressed, longer ones thicker. Stems prostrate to ascending, 0.5–8 cm long, growing 0.5–3 cm per year, in first year 1–2 mm in diameter. Stipules thinly membranaceous, hyaline at free portion, older ones often deflexed and wrinkled, whitish yellow, with 3–5 parallel

nerves at upper portion, 4–9 mm long, at a length of 2–4 mm adnate to the petiole, otherwise 0.5–2 mm connate, oblong-lanceolate, acute or acuminate, ciliate, glabrous. Leaves 0.5–3.5 cm long; rachides very dense, thin, rigid, mostly recurved and deflexed, densely appressed hairy; petiole 1/4–1/3 the length of the rachid; end-thorn 1/2–1 time as long as the uppermost leaflets; leaflets in 2–5 pairs, silvery-green, strongly complicate, 3.5–12 mm long and 1–2.5 mm wide, linear to narrowly oblong, acute, with a mucro up to 0.5 mm long, both sides densely shortly sericeous. Inflorescence overtopping the leaves; flowering part lax, with remote flowers, 3–8 cm long and 2–3 cm in diameter; peduncle often longer than leaves, 3–6 cm long, densely to sparsely covered with appressed short (up to 0.7 mm long) and long (up to 3 mm long) hairs, longer hairs sometimes patent. Bracts very soon falling away, thinly membranaceous, hyaline, whitish yellow, purple at tip, broadly ovate at the base of the inflorescence to lanceolate-elliptic further up, 8–15 mm long and 3–6 mm wide, glabrous, sometimes sparsely ciliate. Calyx creamy with purple nerves and teeth, with 12–17 parallel nerves, 11–16 mm long and 3–4 mm wide, tubular, only slightly inflated at fruiting time to tubular-elliptic, sparsely villose; teeth 6–8 mm long. Corolla limb red, violet to dark purple. Standard 15–22 mm long; limb 10–15 mm long and 6–8 mm wide, elliptic to oblong-panduriform, at middle or lower third constricted, round tipped, minutely mucronulate, at the base sharply hastate; claw 5–7 mm long, broadly cuneate. Wings 13–18 mm long; limbs 6–9 mm long and 2.2–3.5 mm wide, narrowly oblong, obtuse or rarely slightly acuminate; auricle 0.2–0.6 mm long; claw 7–9.5 mm long. Keel 12.5–17 mm long; limbs 5–6 mm long and c. 3 mm deep, oblong or triangular-obovate, with almost rectangular bent lower edge and concave upper edge, obtuse, minutely mucronulate; auricle distinct; claw 7.5–11 mm long. Stamens at upper (3–)4–5 mm free from each other. Fruit 5–7 mm long, 1.5–2 mm high and 3–4 mm wide. Seeds olive-green to dark brown, sometimes with sparse black spots, 4–4.5 mm long and 2–3 mm wide, elliptic, flattened, at first smooth becoming rugose.
Flowering and fruiting time: VI–VII.
Distribution: W and NW Iran. Map 6.

Specimens seen:

Iran. Prov. W Azarbaijan: c. 5 km SW of Tekab, 2400 m, 5.6.1974, *Wendelbo et al. 12240* (LE, W) – Bonab to Chaftan, 1500–1950 m, 7.6.1977, *Moussavi & Tehrani 36817* (W). – Prov. Kordestan: Bijar, Kuh-e Hamzeh Arab, 2000–2600 m, 31.6.1971, *Termeh 40786, 40928* (W) – In monte Hamzeh Arab SE Bijar, 2200–2600 m, 1.7.1971, *Lamond & Termeh 42576* (W) – Bijar to Sanandaj, 72 km to Sanandaj, 1950 m, 1.7.1971, *Termeh 40785* (W) – In saxosis et ad versuras 47 km W Bijar versus Divandarreh, 2000 m, 2.7.1971, *Rechinger 42679* (W). – Prov. Kermanshah: 15 km NW Songhor, 13.6.1959, *Pabot 1824* (M). – Prov. Zanjan: Persia bor., inter Chorum-derreh et Sultanieh, 6.6.1859, *Bunge & Bienert* (G-BOIS, P). – Prov. Hamadan: Aq Bulaq, c. 100 km N Hamadan, 15.6.–1.7.1960, *Rioux & Golvan 306* (W).

A. paralurges differs from other species of the section in having very short leaves, lax inflorescence and a scarcely inflated fruiting calyx. Some populations of *A. rubrostriatus*, which is the closest relative of the former, also have lax inflorescence and sometimes a tendency to have short leaves. The following table can be used to distinguish the two species:

Character states in *A. rubrostriatus*	Character states in *A. paralurges*
rachides mostly straight	rachides mostly recurved
stipules whitish	stipules yellowish
leaflets mostly longer than 10 mm	leaflets 4–10 mm long
calyx 5–8 mm wide at fruiting time	calyx 3–4 mm wide at fruiting time

14. ***Astragalus pedicularifórmis*** Maassoumi, Iran. J. Bot. 6(2): 208. 1995. **Holotype**: Iran: Prov. Zanjan, Soltanieh, Arjin village, Kuh-e Sheikh-Serri, 2100–2250 m, 2.7.1991, *Ranjbar et al. 69603* (TARI!).

Fig. 5 b

Plants 15–20 cm high. Hairs 0.1–1 mm, on peduncle up to 2 mm and on calyx up to 4 mm long, mostly thin, longer ones somewhat thicker. Stems from a prostrate base ascending, up to 12 cm long, growing 0.5–5 cm per year, in first year 1–2.5 mm in diameter. Stipules thinly membranaceous, hyaline, yellowish, with 5–8 parallel nerves at free portion, 12–20 mm long, at a length of 7–10 mm adnate to the petiole, otherwise 1.5–4 mm connate, triangular to lanceolate, acuminate, glabrous or younger ones pilose only at the base, ciliate. Leaves 3–11 cm long; rachides dense, rigid, thick, straight oblique to subhorizontal, rarely curved, sparsely appressed shortly hairy, glabrescent; petiole 1/6–1/4 the length of the rachid; end-thorn 1/3–1/1 of the length of the uppermost leaflets; leaflets in 4–7 pairs, remote, light to dark green, flattened or slightly complicate, 5–15 mm long and 1.5–4 mm wide, narrowly oblong-elliptic, acute, with a mucro up to 2 mm long, both sides sparsely appressed hairy, glabrescent. Inflorescence not overtopping the leaves; flowering part ± dense, 3.5–6 cm long and 3–3.5 cm wide; peduncle 0.5–6 cm long, densely appressed villose. Bracts thickly membranaceous, yellowish white, hyaline at margins, purple at tip, 8–16 mm long and 2.5–6 mm wide, ovate-elliptic, long acuminate, glabrous or sparsely appressed pilose on the midrib. Calyx whitish or creamy, red at the teeth, at first tubular, later on ovate-elliptically inflated, 11–15 mm long and 4–8 mm wide, with 17–25 parallel nerves, densely appressed hairy, becoming sparsely villose; teeth 4–7 mm long. Corolla limb dark purple. Standard 13–18 mm long; limb 7.5–12 mm long and 5–7 mm wide, oblong-panduriform, obtuse or rarely retuse at tip, sometimes minutely mucronulate, sharply hastate at base; claw 4–8 mm long, broadly cuneate. Wings 13–17 mm long; limbs 6–8.5 mm long and 2.5–3 mm wide, narrowly oblong, obtuse; auricle 0.3–0.6 mm long; claw 7.5–9.5 mm long. Keel 11.5–15 mm long; limbs c. 5 mm long and 2–3 mm deep, obovate-triangular to ± oblong, with almost rectangular curved lower edge and straight or ± convex upper edge, obtuse, minutely mucronulate; auricle minute; claw 7.5–10 mm long. Stamens at upper 3–5 mm free from each other. Fruit and seeds unknown.
Distribution: NW Iran. Map 6.

Specimens seen:

Iran. Prov. Zanjan: Soltanieh, 7 km to Soltanieh from Gheydar (Qeydar), 1850 m, 2.7.1974, *Alava 14178* (TUR) & *Termeh & Moussavi 40920* (W) – Soltanieh, Arjin village, Kuh-e Sheikh-Serri, 2100–2250 m, 2.7.1991, *Ranjbar et al. 69603* (TARI).

This newly described species is known only from one locality about Sultanieh in Prov. Zanjan (Iran). However, the glabrous bracts, glabrescent leaves and thinly membranaceous stipules are so characteristic that we have not any doubt to accept it

as a good one. The above mentioned characters separate it from its next relatives namely *A. tabrizianus*. Such locally endemics are not rare in the sect. *Hymenostegis*.

In the original description the size of the standard was cited as 18–24 mm, but this is certainly a mistake.

15. ***Astragalus persicus*** (DC.) Fisch. & C.A.Mey., Ind. Sem. Hort. Petrop. 1: 3. 1835 ≡ *A. lagopoides* Lam. var. *persicus* DC., Prodr. 2: 299. 1825 ≡ *A. olivieri* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 69. 1868 et l.c. 15(1): 115. 1869 ≡ *A. mesopotamicus* Boiss. var. *olivieri* (Bunge) Boiss., Fl. Or. 2: 381. 1782. **Holotype**: inter Kermancha et Amadan [inter Kermanshah et Hamadan], *Olivier & Bruguière* (P!).

= *A. mesopotamicus* Boiss., Diagn. Pl. Or. Nov. 2: 68. 1843. Holotype: Mesopotamia, *Aucher 1275* (G-BOIS!; Iso: G!, P!).

= *A. bounophilus* Boiss. & Hohen. in Boissier, Diagn. Pl. Or. Nov. 9: 99. 1849 ≡ *Tragacantha bounophila* (Boiss. & Hohen.) Kuntze, Revis. Gen. 2: 943. 1891. Holotype: Syach Nala [Palas] ad radice montis Demawend prope Lar, 13.6.1843, *Kotschy 313* (G-BOIS!; Iso: G!, GOET!, H!, LE!, M!, P!, REG!, TUB!, W!: foto MSB!, WAG!).

= *A. kapherrianus* Fisch., Bull. Soc. Imp. Naturalistes Moscou 26(2): 446. 1853. Lectotype (here designated): Persia bor. Prov. Ghilan, *Kapherr* (LE!: sub *A. persicus*).

= *A. rubriflorus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 67. 1868 et l.c. 15(1): 109. 1869 ≡ *Tragacantha rubriflora* (Bunge) Kuntze, Revis. Gen. 2: 947. 1891. Lectotype (here designated): Elbrus prope Assad-bar, 14.7.1843, *Kotschy 524* (P!; Iso: BM!, G-BOIS!, LE!, PRC!, W!).

= *A. seidabadensis* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11 (16): 68. 1868 et l.c. 15 (1): 113. 1869 ≡ *Tragacantha seidabadensis* (Bunge) Kuntze, Revis. Gen. 2: 948. 1891. Holotype: Persia bor.-occ., Seid-abbad prope Tabris, VI.1859, *Bunge & Bienert* (P!; Iso: G-BOIS!, GOET!, LE!, M!, P!, W!, MSB!)

= *A. naftabensis* Sirj. & Rech.f., Ann. Naturhist. Mus. Wien 58: 69. 1951. Holotype: Persiae Prov. Mazanderan, Distr. Nur, inter Kamarband et jugum Naftab, 3200 m, 8.8.1948, *Rechinger 6465* (W!: foto MSB!; Iso: B!, G!, K!, LD!, M!).

= *A. manucherii* Sirj. & Rech.f., Ann. Naturhist. Mus. Wien 58: 70. 1951. Holotype: Mazanderan, Distr. Nur, inter Kamarband et minas carbon. Elika, 3000 m, 8.8.1948, *Rechinger & Manucheri 6410* (W!: foto MSB!; Iso: B!: foto MSB, G!).

= *A. naftabensis* Sirj. & Rech.f. var. *brevipedunculatus* Sirj. & Rech.f., Ann. Naturhist. Mus. Wien 58: 70. 1951. Holotype: Persia, Prov. Mazanderan, in jugo Kandavan, 2600–3000 m, 25.8.1948, *Rechinger 6738* (W!: foto MSB).

= *A. dianat-nejadii* F. Ghahremani., Iran. J. Bot. 5: 106. 1993 (1992). Holotype: Iran, Azarbayejan, Ahar to Kaleibar, protected area of Arasbaran, 1550 m, 8.7.1991, *F. Gharemani-Nejad & Zarre 69611* (TARI!; Iso: Herb. Univ. Tarbiat-Moallem).

= *A. capax* Maassoumi, Iran. J. Bot. 6(2): 202–203. 1995. Holotype: Iran, Prov. Tehran, S slope of Damavand mt., 3300–3800 m, 26.6.1988, *Khatamsaz et al. 64734* (TARI)

= *A. expetitus* Maassoumi, Iran. J. Bot. 6(2): 204–205. 1995. Holotype: Iran, Prov. E Azarbaijan, ca. 5 km SW Tekab, 2400 m, 5.6.1974, *Wendelbo et al. 12223* (TARI; Iso: W!)

= *A. ferruminatus* Maassoumi, Iran. J. Bot. 6(2): 206. 1995. Holotype: Iran, Prov. Ilam, Shahabad road, 1510 m, 27.7.1965, *Seraj 24706* (TARI)

= *A. leptynicus* Maassoumi, Iran. J. Bot. 6(2): 207. 1995. Holotype: Iran, Semnan, Semnan to Firuzkuh, 33 km NW of Semnan, 2450 m, 24.6.1974, *Wendelbo & Foroughi 13014* (TARI; iso: LE!, W!)

Figures: KOMAROV, Fl. USSR 12: 433, pl. XXIX, nr. 2, 1946; F. GHAHREMANI, Iran. J. Bot. 5: 107. 1993 (1992) (as *A. dianat-nejadii*).
Fig. 6 a–d

Plants 10–50 cm high. Hairs 0.1–1.5 mm, on peduncle up to 2.5 mm, on the calyx up to 5 mm long, thin, longer ones somewhat thicker, sharply ending. Stems from a prostrate base ascending, up to 15 cm long, in first year 1–3.5 mm in diameter, growing 0.5–5 cm per year. Stipules chartaceous, yellowish, 7–26 mm long, at a length of 3–14 mm adnate to the petiole, otherwise 1–7 mm connate, triangular-lanceolate, acuminate or rarely acute, sometimes two tipped, with 5–8 parallel nerves at free portion, glabrous, ciliate or not. Leaves 1–20 cm long; rachides dense, mostly thick, rigid or rarely flexible, straight or curved, oliquely erect to deflexed, older ones mostly broken, densely or sparsely covered with appressed or spreading hairs; petiole 1/4–1/2 the length of the rachid; end-thorn 1/8–1/1 the length of the uppermost leaflets; leaflets in 3–10 pairs, dense or remote, greyish green to green, 4–30 mm long and 1.5–7 mm wide, narrowly oblong-elliptic or rarely ovate, mostly flattened, obtuse or acute, with a mucro of 0.4–1.5 mm long, both sides densely sericeous to spreadingly hairy, glabrescent. Inflorescence higher or rarely shorter than the leaves; flowering part very dense 3.5–11(–15) cm long and 2.5–3.5(–4) cm wide, ovate to long cylindrical or rarely globose; peduncle 0.5–24 cm long, shorter to longer as the leaves, densely covered with short appressed and between them some longer, thicker and subappressed hairs, or densely villose. Bracts thinly membranaceous to glumaceous, sometimes hyaline towards margins, pale yellow to greyish, rarely purple at tip, 8–27 mm long and 3–10 mm wide, broadly ovate to lanceolate-elliptic, shortly or long acuminate, ± densely pilose at whole surface or only on the midrib and apex hairy or wholly glabrous, ciliate or not. Bracteoles rarely present, thinly membranaceous, yellowish white, c. 4 mm long and up to 1.5 mm wide, glabrous. Calyx creamy, with red teeth and nerves at least towards the teeth, tubular at first, soon becoming globosely, ovately to elliptically inflated, 10–18 mm long and 3–8 mm wide, with 17–26 parallel nerves, densely appressed long hairy becoming villose; teeth 3.5–8 mm long. Corolla limb pink to red or purple, rarely white to pale yellow sometimes turning to brown in drying state. Standard 13–23(–25) mm long; limb 7.5–15 mm long and 5–8 mm wide, oblong-panduriform, retuse at tip, sometimes minutely mucronulate, sharply hastate at base; claw 6–8 mm long, broadly cuneate. Wings 13–20 mm long; limbs 5.5–8 mm long and 1.5–2.8 mm wide, narrowly oblong, obtuse; auricle 0.3–1 mm long; claw 7.5–12 mm long. Keel 11.5–17 mm long; limbs 4.5–6 mm long and 2–3 mm deep, obovate-triangular or rarely elliptic, with ± rectangular or rarely broadly curved lower edge and straight or convex upper edge, obtuse, sometimes minutely mucronulate; claw 6.5–11 mm long. Stamens at upper 2.5–5 mm free from each other. Fruit 4–7 mm long, 1–1.5 mm high and 2–4.5 mm wide. Seeds light to dark brown, sometimes with black spots, 3–5 mm long and 2–3.5 mm wide, elliptic to broadly elliptic, pitted.
Flowering and fruiting time: V–VIII.
Distribution: Azerbeidzhan, W, N Iran. Map 7.

Specimens seen:
1. Typical specimens of *A. persicus*:

Azerbeidzhan. In collibus aridis arenosis Swant, Georg. cauc. 4000–6000 ft, VI.–VII.1836, *Hohenacker* (G-BOIS, M, W) – In montibus Taliisch, prope pag. Swant, *C.A. Meyer1267* (G-BOIS, LE, W).

Iran. Prov. Tehran: Gajereh, 2650 m, *Amin 16101* (W) – Montes Elburz: In saxosis calc. inter Shemshak et jugum Dizin, 2900 m, 25.6.1977, *Rechinger 57191* (W) – Dizin, Pey-

Kamar, 2650–2750 m, 22.6.1982, *Moussavi et al. 41126* (W) – Alborz: Gajereh, Dizine, 2400–2600 m, 12.7.1977, *Termeh & Matine 36734* (W) – Alborz, valle de Taleghan, 3050 m, *Klein 2988* (W) – M.Elburs occid., Warwatche, 3700 m, *Klein 4032* (W) – Talagan, 1280 m, 12.7.1972, *Mirfakhraty 15872* (W) – Barry ditionis Asadbar, 2800 m, 26.6.1902, *J. & A. Bornmüller 6873* (B, W) – Elbursgebirge, N vom Kendewan pass, 2970 m, 5.7.1936, *Gilli* (W) – dto. c. 2700–3000 m, *Rechinger 2114* (B, W) – E du col de Kandavan, 2900–3050 m, 26.7.1960, *Pabot 4477* (MSB, W) and *1279* (W) – Elburz mts., above the Kandevan pass, 3200 m, 25.6.1966, *Archibald 2497* (W) – In declivibus australibus jugi Kandavan, 2400 m, 25.6.1975, *Renz 53797* (W) – In regione subalpina alpium Totschal, in latere boreali, 2400 m, 11.6.1902, *J. & A. Bornmüller 6871* (B) – Teheran, in declivibus ad pedem montium Elburz supra vicum Darband et declivia montis Kuhha-ye Touchal, 2000–3800 m, 29.6.1977, *Sojak 6940* (PR) – Elbursgebirge, Ufer des Tarsees, 2810 m, 15.7.1936, *Gilli* (W) – Elburs, ad Haki, inter Dschoistan et Hazartschal, 3000 m, 28.6.1902, *J. & A. Bornmüller 6873b* (B) – m. Elburs occid., in subalpinis vallis fluvii Dschadscherud, prope Schekerabad, 2200 m, 26.6.1902, *J. & A. Bornmüller 6884* (B) – 30' NE Tehran, 10000 ft, 11.7.1962, *Furse 3163* (W) – Keredj, Hesarband (dit. Getschar), 2400 m, 10.7.1953, *Gauba 453* (B) – Gatchsar to Gadjereh, Varang-road to Sorkhab, 2240–2450 m, 9.7.1977, *Termeh & Matin 36749* (W). – Prov. Markazi: 55 km from Arak to Malayer (UT3), 2100 m, 15.6.1984, *Mozaffarian & Maassoumi 48080* (MSB). – Prov. Mazandaran: Elika, Kamarbon, Kuh-e Varvasht, 3200–3650 m, 13.–14.7.1980, *Termeh et al. 39828* (W) – Kalardasht, Pit-sara to Sarchal, 2700–3600 m, 9.8.1972, *Termeh 40991* (W) – Koudlar, Amarlou (montis), 8.7.1966, *Mir-Kamali 6933* (W) – Elborz: Elika, Makliz (montis), 2400–3400 m, 3.8.1972, *Termeh 15230* (W) – Larijan, Khommeh, 10 km W of Rineh, 2900 m, 21.7.1980, *Moussavi et al. 39861* (W) – pentes sud du Kuh-i Demavend, 2000–3500 m, 18.–20.7.1956, *Schmid 6409, 6410* (G, W) & *6401* (G) – 23 km from Abe-Ali to Polur, 2350 m, 18.7.1972, *Dini & Arazm 15556* (W) – Polur-Tehran, Abali, 2350 m, 17.6.1972, *Babakhanlu & Amin 15767* (W) – Karimserai, 9000 ft, 20.7.1940, *Koelz 16499* (US, W) – ad basin montis Demawend, supra Pelur, 2300 m, 15.7.1902, *J. & A. Bornmüller* (B, LE, W) – Lar valley, 2500 m, 3.7.1974, *Wendelbo and Assadi 13423* (W) – Demawend, in reg. infera supra Lar, 2700 m, 17.7.1902, *J. & A. Bornmüller 6867* (B) – Lar, 2500 m, 19.7.1972, *Dini & Arazm 15710* (W) – Kharsang, Darreh-e Lar, 1900 m, 22.7.1972, *Dini & Arazm 15991* (W) – Polur, Gozal-darreh, 2380–2500 m, 10.7.1982, *Termeh et al. 41128, 41135, 41136* (W) – In collinis Syach Palas valle Laar, prope Damawent, 19.6.1843, *Kotschy 335* (LE, W). – Prov. Gilan: Inter Diardschan et Kilischin, 22.7.1902, *Alexeenko 1029* (LE). – Prov. E Azarbaijan: In latere occidentalis montium Talysh in valle Ambrani, Ardebil versus, 24.6.1880, *Radde* (LE) – 5 km SW of Tekab, 2400 m, 5.6.1974, *Wendelbo et al. 12223* (W) – Ardebil: 42 km to W. Nohour, Lisar, protected area, 2540 m, 23.7.1974, *Foroughi & Assadi 13805* (W) – Sarab, Asbforonshan, 2100 m, 25.7.1970, *Izadyar 14652* (W) – In argillosis 52 km a Siah Chaman versus versus Maragheh, 1600–1750 m, 14.6.1977, *Rechinger 56713* (W). – Prov. Kordestan: Divan Dareh, Sarab, 2150 m, 4.7.1968, *Iranshahr 13273* (W) – Bijar to Sanandaj, 60 km to Sanandaj, 2000 m, 1.7.1971, *Termeh 41002* (W) – prope Hoseynabad, 50–60 km N Sanandaj, 2000 m, 2.7.1971, *Rechinger 42733* (W) – In jugo prope Salavatabad 25 km E Sanandaj, 3.7.1971, *Rechinger 42811* (W) – Prov. Kermanshah: Sungur, in m. Kuh Emrallah, 3.6.1902, *Strauss* (B, W) – ca. 120 km S Kermanshah, route de Kermanshah-Ilam, 27.6.1965, *Seraj SJ VII e/8* in hb. PABOT (G). – Prov. Hammadan: 40 km NW of Hamadan, 28.6.1965, *Ledingham, Zohary et al., 4255* (LE, W) – am Elwend bei Haydare, 6.6.1882, *Pichler* (B, W) – In m. Elwend, VIII.1898, *Strauss* (B) – In dit. urb. Hamadan, montes Karaghan, VII.1899, *Strauss* (B). – Prov. Lorestan: Azna, 1800 m, 9.6.1937, *Köie 1276* (B, C, W) – Bordsch, 2200 m, 18.6.1937, *Köie 1268* (B, C, W). – Prov. Semnan: 45–52 km Shahmirzad towardss Fulad-Mahalleh, 2200–2300 m, 9.7.1974, *Renz & Iranshahr 16733* (W) – 90 km Semnan vers Sari, Parvar (région protégée), Kuhha-ye Kolurd, 2180–2320 m, 10.8.1978, *Termeh et al. 39424* (W) – Elburz mts.: Nezva Kuh area: Shahmirzad (Bashm) kuh, 2300 m, 10.7.1959, *Wendelbo 1323* (BG, LE, W) – Shahmirzad, Kuh-e Nizva, 2800 m, 1.8.1972, *Iranshahr & Zargani*

15206 (W) – 35 km from Semnan to Shahmirzad, Fulad Mahalleh, 2350–2500 m, 9.7.1074, *Rense & Iranshahr 16725* (W) – Semnan to Firuzkuh, 33 km NW of Semnan, 2450 m, 24.6.1974, *Wendelbo & Foroughi 13014* (LE, W) – Parvar, Protected Region: In montibus inter Shahmirzad, et Fulad Mahalla, 68 km NE Semnan, 2200 m, 30.5.1975, *Rechinger 52335* (W).

2. Specimens with bracts longer than calyx:

Iran. Prov. Tehran:Alamut, Hyle road, 2100 m, 6.6.1973, *Babakhanlu & Amin 15080* (W) – Akbarabad, Alamut, 2000 m, 7.7.1973, *Babakhanlu & Amin 15632* (W) – Pass between Qazvin and Manjil, 1500 m, 13.7.1975, *Wendelbo & Assadi 18291* (W) – Sirachal, Karaj-Chalus, 1980 m, *Babakhanlu & Amin 16059* (W) – Khargushdarreh, Karaj-Chalus, 2450 m, 24.6.1973, *Babakhanlu & Amin 16092* (W) – In valle Talagon prope Gattade, 14.7.1843, *Kotschy 522* (G-BOIS, W) – dto., 2300 m, 27.6.1902 and 1.7.1902, *J. et A. Bornmüller 6882* & *6881* (B, W) – ad Gerab in valle Talkan, 2300 m, 26.6.1902, *J. et A. Bornmüller 6883* (B) – Ad pagum Deda districtus Talkan, 2350 m, 1.7.1902, *J. et A. Bornmüller 6885* (B) – M. Elburs occid., ad Getschsar, in valle Lur, 2200 m, 20.6.1902, *J. et A. Bornmüller 6887* (B, LE, ZT) – Karadj, Asara, Sepahsalar, 5.7.1968, *Termeh & Izadyar 40793* (W) – Elburz mts., Kandavan region, S side, 2700–2900 m, 5.7.1974, *Wendelbo & Cobham 13460* (W) – dto., 2700–3800 m, 8.7.1977, *Sojak 7763* (W) and*7770* (PR) – Tehran, Shemshak, 1.7.1966, *Kashkouli 40922* (W). – Prov. Mazandaran: E of Demavand, Rene, 8000 ft, 22.6.1965, *Ledingham 4175* (LE, W) – Elika to Varvasht, 2500–3200 m, 15.7.1980, *Termeh et al. 40841* (W).

3. Low cushion forming forms with densely branched stems, hyaline bracts and stipules, consistent with the type of *A. manucherii*:

Iran. Prov. Mazandaran: Nour, Kalej, Neli-Pashteh,Kouha-ye Sardabeh, 8.7.1982, *Termeh et al. 41129* (W) – 4 km S of Reyneh, on E slope of mt. Demavand, 2200 m, 27.7.1964, *Grant 16,516* (W). – Prov. Tehran: Inter Djabun et Firuzkuh, c. 2200 m, 29.6.1937, *Rechinger 1154b* (W) – Road of Ab-Ali to Plur, 1350 m, 18.7.1972, *Dini & Arazm 15707* (W) – 10 km NE Firuzkuh, 10000 ft, 29.6.1962, *Furse 2951* (E,) – 16 km E Firuzkuh, 1950 m, 23.6.1972, *Babkhanlu et al. 15822* (W). – Prov. Semnan: Elburz mts.: Nezva Kuh area: N side of Shahmirzad (Bashm) Kuh, 2200 m, 10.7.1959, *Wendelbo 1301* (BG, W) – S des Kuh-i Nizwa: Im Tal von Sar-lasch, 2350 m, 31.7.1948, *Behboudi & Aellen 1041* (G-Aellen) – Oberlauf des Kuh-i Nizwa, Berghang neben Djashm (Tschafte) 2200 m, 27.7.1948, *Behboudi & Aellen 5601* (G-Aellen, W).

A. persicus is the most variable species in the section. Shortly pedunculate forms of it were named *A. rubriflorus* or *A. naftabensis* var. *brevipedunculatus*, specimens with thin and flexible rachides and short flowers were called *A. bounophilus*, long bracteate forms were named *A. lagurus* var. *virescens* (nom. nud.), and specimens with hyaline stipules and bracts were known as *A. manucherii*. After many field studies and revising all the herbarium material, we concluded that there are no exact limits between these forms. The many intermediates make it necessary to unite all these forms into one species. Moreover, in some regions such as Lar valley near Damawand mountain (N Iran) all of the forms can be seen together. Although the extreme forms seem to be very different from each other, the range of variation in most characters is absolutely continuous.

The indumentum is also very variable. The rachides, leaflets and peduncles can be appressed hairy or tomentose. The length of hairs varies extensively in different forms. But, interestingly, forms with short peduncles have mostly shorter hairs on it, and so they can be separated from similar forms of *A. hirticalyx*.

Another problem is the extreme variability in size of the bracts, their texture and indument. The bracts are in some forms even longer than those of *A. lagopoides* and therefore these forms can be confused with the latter. Fortunately these morphs occur only in a limited region about Tehran, which is relatively far from the main area of *A. lagopoides*. Moreover, such specimens of *A. persicus* have patent hairy rachides and peduncles and tomentose leaflets, in difference to *A. lagopoides,* whose vegetative parts are always appressedly hairy. The long bracteate forms of *A. persicus* have mostly purple tipped bracts, whereas purple tipped bracts are very rare in *A. lagopoides*.

Forms of *A. persicus*, which coincide the type of *A. bounophilus* (with thin, flexible and recurved rachides and ± globose inflorescence) occur also in western part of Iran at the border to Iraq where they were named *A. mesopotamicus*.
The following collection: Prov. Khorasan: Chehel dokhtar, Deh-sefid towards Dasht-aheh (protected region), 1550 m, 23.7.1975, *Moussavi & Karavar 33601* (W), is closely related to *A. persicus* but differs from it in having a larger corolla, which is shorter or as long as the calyx. Moreover, the inflorescence of it is wider than in *A. persicus* (more like in *A. glumaceous*). This is surely a representative of a new taxon, but more material is needed for an exact decision.

Colour of the flowers is also variable in this species. Two different populations with white (by drying changed to yellow) flowers are known to us: One of them occures in NW Iran in Arasbaran protected region (described as *A. dianat-nejadii*), and the second one in southern part of province Kermanshah towards Ilam (SW Iran) which was described newly by MAASSOUMI (1995) as *A. ferruminatus*. Both species were compared with the yellow-flowered species *A. chrysostachys* in original descriptions, but according to their thickly membranaceous and hairy bracts, these white-flowered plants belong clearly to *A. persicus* and not to yellow-flowered *A. chrysostachys* with hyaline and glabrous bracts. Specimens with white (or yellow) flowers can be found also in populations with red or purple flowers. The collection *Wendelbo & Assadi 13423* is an example for this. It was collected in Lar valley (near Damavand-Iran), where most of specimens of *A. persicus* have pink to red flowers.

See also the notes of *A. chrysostachys* and *A. hirticalyx*.

16. ***Astragalus recognitus*** Fisch., Bull. Soc. Imp. Naturalistes Moscou 26(2): 452. 1853 ≡ *Tragacantha recognita* (Fisch.) Kuntze, Revis. Gen. 2: 947. 1891. **Holotype**: In ditione Rescht, a PRESCOTT communicavit, fortasse *Aucher* [*4403* ?] (LE!: a PRESCOTT communicavit; Iso: G!: no. *4403*, G-BOIS!, P!, W!).

Fig. 4 b

Plants 10–20 cm high. Hairs yellow, 0.1–2 mm, on the calyx up to 4 mm long, mostly very thin, straight. Stems prostrate to ascending, up to 10 cm long, growing 0.5–2 cm per year, in first year 1–3 mm in diameter. Stipules chartaceous, yellowish, not hyaline, with 8–13 parallel nerves in upper portion, 7–20 mm long, at a length of 4–10 mm adnate to the petiole, otherwise up to 1–2 mm connate, from a narrow triangular base acuminate, glabrous, ciliate. Leaves 1.5–9 cm long; rachides dense, ± thin, rigid, obliquely erect to recurved, densely covered with appressed hairs, becoming tomentose; petiole 1/3–1/2 the length of the rachid; end-thorn 1/4–1/2 the length of the uppermost leaflets; leaflets in (2–)3–7 pairs, ± dense, yellowish-green to silvery-green, ± flattened, 5–12 mm long and 2–4 mm wide, narrowly oblong to narrowly elliptic, obtuse, with a mucro up to 1.5 mm long, both sides densely covered with appressed long straight hairs. Inflorescence slightly overtopping the leaves; flowering part dense, 4–8 cm long and c. 3 cm in diameter; peduncle thick, shorter or

as long as the leaves, 3–9 cm long, densely appressedly hairy. Bracts chartaceous, not hyaline, yellow, sometimes pink-tipped, lower ones mostly falling away, 8–14 mm long and 3–8 mm wide, broadly ovate to lanceolate-elliptic, acuminate, sparsely appressed pilose all over or only at midrib and apex, ciliate. Calyx yellow to light orange, sometimes with purple teeth, with 25–30 parallel nerves, at first tubular, soon becoming elliptically or globosely inflated, 13–18 mm long and 5–10 mm wide, ± densely long appressed hairy becoming sparsely villose; teeth 5–8 mm long. Corolla pale yellow. Standard 16–24 mm long; limb 10–16 mm long and 7–9 mm wide, oblong-panduriform, obtuse or slightly retuse at tip, minutely mucronulate, sharply hastate at base; claw 6–8 mm long, broadly cuneate. Wings 15–20 mm long; limbs 7–8 mm long and 2–3 mm wide, narrowly oblong, obtuse; auricle 0.3–0.6 mm long; claw 8.5–13 mm long. Keel 13–17 mm long; limbs 5–6 mm long and 2.8–3 mm deep, triangular-oblong, with almost rectangular curved lower edge and ± straight upper edge, obtuse, minutely mucronulate; auricle very short; claw 8–11 mm long. Stamens at upper 3–4 mm free from each other. Fruit 8–10 mm long, 1.5–2.5 mm high and 2.5–3.5 mm wide. Seeds light to dark brown, ± flattened, 3–4.5 mm long and 1.5–2.8 mm wide, elliptic to broadly elliptic, pitted.
Distribution: NW Iran. Map 8.
Flowering and fruiting time: V–VII.

Specimens seen:

Iran. Prov. Gilan: In ditione Rescht, fortasse *Aucher* [*4403*] (G, G-BOIS, LE, P, W). – Prov. E Azarbaijan: In faucibus trachyt. ad radices montium Sabalan inter Ardabil et Meshgin Shahr, 25.5.1971, *Rechinger 40454* (W) – Sarab, Gharieh-ye Mir-Kouh-Hadji, 1700–1900 m, 11.–12.6.1986, *Termeh & Daneshpajuh 41361* (W) – Mianeh, Varzeghan, Sonly-Darreh, 1550–1920 m, 5.7.1983, *Moussavi,et al.41074* (W).

A. recognitus is closely related to *A. chrysostachys*, but differs from the latter in having thickly membranaceous bracts and stipules. As has been mentioned before (see the note of *A. persicus* about *A. dianat-nejadii*), some specimens of *A. persicus* also have white to pale yellow corollas. Fruiting specimens of the two species however are easy to separate: Fruits of *A. persicus* are up to 7 mm long and those of *A.recognitus* 8–10 mm long. Moreover, leaflets of the latter have a double indumentum of curled, short hairs and appressed straight longer hairs, a character, which is easily to see on lower leaf surface. The hairs of *A. recognitus* are yellowish in most of the specimens seen .

17. ***Astragalus rubrostriatus*** Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 68. 1868 et l.c. 15(1): 113. 1869 ≡ *Tragacantha rubrostriata* (Bunge) Kuntze, Revis. Gen. 2: 947. 1891. **Holotype**: Persia bor. occ., inter Mianeh et Sengan, inter Agh-Kent et Bagh, 7.6.1859, *Bunge & Bienert* (P!)
= *A. sciureus* Boiss. & Hohen. var. *tefreschensis* Bornm., Beih. Bot. Centralbl. 32(2): 374. 1914. Lectotype (here designated): In mte. Kuh-i-Gäsawend, 1.7.1909, *Strauss* (B!: foto MSB!; Iso: JE!).
= *A. pseudobrunsianus* Maassoumi, Iran. J. Bot. 6(2):209.1995. Holotype: Iran, Tehran, S of Tehran, Kuh-e Bibi Shahrbanou, 1350 m, 24.6.1973, *Basbakhanlou & Amin 15215* (TARI; Iso: W!).

Fig. 2 d

Plants 10–20 cm high, up to 30 cm including inflorescence. Hairs 0.1–0.8 mm, on the peduncle up to 2 mm, on the calyx up to 5 mm long, mostly strongly appressed, longer ones thicker than the remainder. Stems from a prostrate base ascending, 2–18 cm long, growing 0.5–4 cm per year, in first year 1–3 mm in diameter. Stipules thinly membranaceous, hyaline at free portion, whitish yellow, with 1–3 parallel nerves at free portion, 4–12 mm long, at a length of 2–7 mm adnate to the petiole, otherwise 1–3 mm connate, narrowly triangular, acute or acuminate, glabrous, ciliate or not. Leaves 0.5–8 cm long; rachides very dense, thin or thick, rigid, mostly straight, obliquely erect to subhorizontal or rarely deflexed, densely appressed sericeous; petiole 1/4–1/3 the length of the rachid; end-thorn 1/3–1/1 of the length of the uppermost leaflets. Leaflets in 3–7 pairs, dense, silvery-green to grey-green, strongly complicate or rarely flattened, 3.5–21 mm long and 0.5–5 mm wide, linear to narrowly oblong, acute, with a mucro up to 1 mm long, both sides densely to sparsely sericeous. Inflorescence overtopping the leaves; flowering part lax, with remote flowers, 5–15 cm long and 2–3 cm in diameter; peduncle as long or longer than the leaves, 3.5–10 cm long, densely to sparsely covered with appressed short hairs up to 0.7 mm and between them with some subappressed to patent ones up to 3 mm long. Bracts easily falling away, membranaceous, whitish yellow, oblong to broadly ovate at the base of the inflorescence to lanceolate-elliptic or narrowly oblong further up, 8–15 mm long and 2–8 mm wide, glabrous, or sparsely appressed pilose on midrib, ciliate. Calyx creamy with purple nerves and teeth, sometimes at upper part or wholly purple, with 15–24 parallel nerves, 11–16 mm long and 3.5–7 mm wide, at first tubular, becoming elliptically inflated, sparsely villose; teeth 5–7 mm long. Corolla limb pink to purple. Standard 16–23 mm long; limb 11–16 mm long and 7–10 mm wide, oblong-panduriform, in the middle or lower third constricted, shallowly retuse at tip, sometimes minutely mucronulate, sharply hastate at base; claw 4–7 mm long, broadly cuneate. Wings 13–20 mm long; limbs 6–9 mm long and 2.2–3 mm wide, narrowly oblong, obtuse at tip; auricle 0.2–1 mm long; claw 7–11.5 mm long. Keel 12–16 mm long; limbs 5–6 mm long and c. 3 mm deep, obliquely elliptic, with broadly curved lower edge and concave upper edge, obtuse; claw 6.5–10 mm long. Stamens at upper 4–5 mm free from each other. Fruit 4.5–6.5 mm long, 1.5–2 mm high and c. 3 mm wide. Seeds olive-green to dark brown, sometimes with few black spots, c. 4 mm long and 2–3 mm wide, elliptic, flattened, at first smooth becoming rugose.
Flowering and fruiting time: IV–VI.
Distribution: N to W Iran. Map 8.

Specimens seen:

Iran. Prov. Tehran: S. Tehran, Bibishehr Banu mt., 1350 m, 24.6.1973, *Babakhanlu & Amin 15215* (W). – Prov. Gilan: Manjil to Zanjan, Badamestan, 2000 m, 31.5.1971, *Iranshahr 41035* (W) – Kallaj-e-Manjil, 1000 m, 22.5.1973, *Sabei 15785* (W). – Prov E Azarbaijan: In agris derelictis ad meridiem jugi Goja Bel, 1650 m, 29.5.1971, *Rechinger 40956* (W). – Prov. Zanjan: inter Mianeh et Sengan, inter Agh-Kent et Bagh, 7.6.1859, *Bunge & Bienert* (P) – Benab to Chaftan, 1500–1950 m, 7.6.1977, *Moussavi & Tehrani 36801* (W) – Kuh Anguran: In declivibus borealibus jugi Tarom inter Manjil et Zanjan, 2000 m, 31.5.1971, *Lamond & Iranshahr 41106* (W) – Kuh Anguran, 35–42 km SW Tashvir, inter Manjil et Zanjan, 1900–2200 m, 2.6.1971, *Lamond & Iranshahr 40909* (W) – Manjil to Zanjan, Tarom pass, 2100 m, 2.6.1971, *Lamond & Iranshahr 3600* (M) – Kallaj-e-Manjil, 1000 m, 22.5.1973, *Sabei 15785* (W) – 44 km from Gilvan, road to Zanjan, 2100 m, 18.6.1991, *Akhani 7294* (MSB). – Prov. Hamadan: Hamadan, montes Karagan, VI.1899, *Strauss* (B) – montes Tefresch, 1897, *Strauss* (B) – Abgarm-Avaj, road of Mahmudabad, 1450 m, 14.5.1974, *Dini & Bazargan 8677* (W).

A. rubrostriatus is closely related to *A. sciureus*, but differs from it mainly in having soon inflating calyces. The stipules and the leaves of the latter are also mostly much longer than in *A. rubrostriatus*. *A. sciureus* is much robuster than *A. rubrostriatus* and has often very long flowering part of inflorescence.

18. ***Astragalus sciureus*** Boiss. & Hohen. in Boiss., Diagn. Pl. Or. Nov. 9: 98. 1849 ≡ *Tragacantha sciurea* (Boiss.) Kuntze, Revis. Gen. 2: 948. 1891. **Holotype**: ad Gattade vallis Talagon montis Elbrus, 14.7.1843, *Kotschy 520* (G-BOIS!; Iso: G!, GOET!, H!, LE!, MSB!, P!, PRC!, TUB!, WAG!).

= *A. tenax* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 68. 1868 et l.c. 15 (1): 113. 1869 ≡ *Tragacantha tenax* (Bunge) Kuntze, Revis. Gen. 2: 948. 1891. Holotype: Iran, Prov. Zanjan, inter Teheran et Tabris, inter Chorum-derreh et Sultanieh, 6.6.1859, *Bunge & Bienert* (P!, G-BOIS!).

= *A. sciureus* Boiss. & Hohen. var. *subsessilis* Bornm., Bull. Herb. Boiss., sér. 2, 5: 765. 1905. Holotype: In planitiei Saudsch-Bulag inter Agababa et Kaswin, 1300–1400 m, 13.5.1902, *Bornmüller 6874* (B!: cum diagnosi: foto MSB!; Iso: JE!).

Fig. 2c

Plants 15–40 cm high, up to 70 cm including inflorescence. Hairs 0.1–1.5 mm, on peduncles sometimes up to 3 mm and on the calyx up to 6 mm long, thin. Stems mostly ascending, up to 20 cm long, growing 1.5–5 cm per year, in first year 2–5 mm in diameter. Stipules thinly membranaceous, hyaline, whitish to yellow, with 5–8 parallel nerves at free portion, 15–27 mm long, at a length of 7–15 mm adnate to the petiole, otherwise 4–9 mm connate, triangular-acuminate, wholly glabrous or only ciliate at margins. Leaves 3–16 cm long; rachides ± dense, often rigid and thick, straight, obliquely erect to horizontal or curved, rarely deflexed, densely covered with appressed to subappressed or rarely spreading hairs; petiole 1/5–1/3 the length of the rachid; end-thorn 1/10–1/5(–2/3) the length of the uppermost leaflets; leaflets in 3–10 pairs, whitish green, ± remote, 9–32 mm long and 2.5–5 mm wide, mostly flattened, linear to narrowly oblong-elliptic, acute, with a mucro up to 1.5(–2) mm long, both sides densely covered with appressed or rarely spreading hairs. Inflorescence overtopping the leaves; flowering part lax, (7–)13–25 cm long and 1.5–2.5(–3.5) cm wide, long cylindrical; peduncle shorter or rarely longer than leaves, 4–30 cm long, densely to sparsely covered with short appressed thin hairs up to 1.5 mm long and beside them with some subappressed thicker hairs up to 3.5 mm long, sometimes densely villose. Bracts thickly membranaceous, not hyaline or only so at margins, yellowish, mostly with purple tip, 10–18 mm long and 3–8 mm wide, lanceolate-elliptic, long acuminate, wholly glabrous or rarely sparsely pilose at the apex and midrib. Calyx pale yellow or creamy with purple nerves and teeth, sometimes the tube in upper part or wholly purple, 12–24 mm long and 4–6 mm wide, tubular, with 17–25 parallel nerves, densely long appressed hairy becoming densely villose; teeth 5–11 mm long. Corolla limb pink to red or light purple. Standard 16–26 mm long; limb 9–17 mm long and 5–9.5 mm wide, obovate or obovate-panduriform, rounded or slightly retuse at the apex, minutely mucronulate, hastate-auriculate at base; claw 5–9 mm long, cuneate. Wings 15–23.5 mm long; limbs 6.5–12 mm long and 2.5–3 mm wide, narrowly oblong, sometimes slightly expanded in upper part, obtuse or obliquely acute at tip; auricle 0.3–0.6 mm long; claw 9–12 mm long. Keel 14–20 mm long; limbs 5–6.5 mm long and 2.5–3.5 mm deep, obovate-triangular, with narrowly curved lower edge and ± concave upper edge, obtuse, minutely mucronulate; claw 9–15 mm long. Stamens at upper 4–5 mm free from each other. Fruit 7–8 mm long, 1.5–2 mm

high and 3–4 mm wide. Seeds light to dark brown, 3.5–4.5 mm long, 2.5–2.8 mm wide, elliptic-reniform, ± flattened, pitted.
Flowering and fruiting time: (V–)VI–VIII.
Distribution: N-Iran. Map 8.

Specimens seen:

Iran. Prov. Tehran: Kondar, 35 km NE Karaj, 2000 m, 25.6.1974, *Amin & Bazargan 19325, 19326* (W) – m. Elburs occid., inter Getschesar et Asadbar, 2500 m, 19.6.1902, *J. et A. Bornmüller 6875* (B) – ad Gattade vallis Talagon montis Elbrus, 14.7.1843, *Kotschy 520* (G, G–BOIS, GOET, H, LE, MSB, P, PRC! TUB, WAG) – m. Elburs, in valle Talekan, supra Dschoistan, 2100 m, 27.6.1902, *J. et A. Bornmüller 6876* (B) – In districtu Talekan ad pagum Deda, 2350 m, 1.7.1902, *J. et A. Bornmüller 6878* (B) – In valle Talekan ad Gattadeh, 2300 m, 27.6.1902, *J. et A. Bornmüller 6879* (B, P, W) – Talagan, 2080 m, 14.7.1972, *Foroughian 16058* (W) – Talegan mts, 2500 m, 16.7.1972, *Foroughian 15474* (W) – Karaj-Chalus, Sirachal, 1900 m, 30.7.1973, *Amin 14986* (W) – Keredj, Kuh Daschteh, 2400–2600 m, 9.7.1934, *Gauba 30* (B) – Gatchsar to Gadjereh, Dizine, 2400–2600 m, 12.7.1977, *Termeh & Matin 36734* (W) – Zentral-Elburs: am südabhang des Totschal im Tal Häfthous nordwestlich von Teheran, 1300–1500 m, 4.7.1948, *Aellen 1018* (W). – Prov. Zanjan: Zanjan to Qazvin, Asad Abad, 1950 m, 11.7.1972, *Foroughian 15546* (W) – 8 km a pago Ziaran (c. 50 km E ab oppido Qazvin, 11.7.1977, *Sojak 7710* (PR) – Qazvin, Atanak, 2060 m, 26.6.1972, *Foroughian & Hariri 15362* (W) – In planitiei Saudsch-Bulag inter Agababa et Kaswin, 1300–1400 m, 13.5.1902, *Bornmüller 6874* (B, JE) – Aqqbaba, road of Rasht-Qazvin, 2000 m, 12.7.1972, *Foroughian & Hariri 15803* (W) – inter Teheran et Tabris, inter Chorum-derreh et Sultanieh, 6.6.1859, *Bunge & Bienert* (G–BOIS, P) – Not to localize: In Thale des Kischlakh-rud ad mont. Perinosch-chaue, 28.5.1906, *Strauss* (B).

A very long inflorescence is the most conspicuous character of this species. Moreover, the not or only slightly inflated fruiting calyx make it distinguishable from other species of the section with long inflorescences. Some specimens of *A. sciureus*, which approach the type of *A. tenax* have shorter and ± dense inflorescence. These specimens can be confused with *A. persicus* by mistake. However, the not inflating calyx is a good character here to prevent any error.

Var. *subsessilis* is only an immature specimen of *A. sciureus*. See also the note under *A. rubrostriatus*.

19. *Astragalus straussii* Bornm., Beih. Bot. Centralbl. 19(2): 234. 1906. Syntypes: Sultanabad, inter Girdu et Nesmabad, 2.6.1889, *Strauss* (JE!); dit. urbis Sultanabad, in monte Schahsinde, VI.1897, *Strauss*; in monte Raswend, V.1896, *Strauss* (B!); Burudschird, V.1898, *Strauss* (B!, JE!); Hamadan, monte Karagan, VII.1889, *Strauss* (JE!). **Lectotype** (designated here): dit. urbis Sultanabad, in monte Schahsinde, VI.1897, *Strauss* (B!: foto MSB!; Iso: BRNM!, JE!).
= *A. straussii* Bornm. var. *albiflorus* Bornm., Beih. Bot. Centralbl. 19(2): 234. 1906. Holotype: In monte Raswend, V.1896, *Strauss* (B!).

Fig. 1c

Plants 20–35 cm high. Hairs 0.1–1 mm, on peduncles and calyx up to 3.5 mm long. Stems mostly ascending, up to 20 cm long, growing 1.5–5 cm per year, in first year 2–5 mm in diameter. Stipules thinly membranaceous, hyaline at free portion, whitish to yellow, with 8–13 parallel nerves at free portion, 12–23 mm long, at a length of 7–10 mm adnate to the petiole, otherwise 1–3 mm connate, triangular-acuminate, wholly

glabrous or ciliate at margin. Leaves 2.3–8.5 cm long; rachides ± remote, often rigid and thick, mostly curved, obliquely erect to horizontal or rarely deflexed, densely or sparsely covered with appressed to subappressed or rarely spreading hairs; petiole 1/5–1/3 the length of the rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in 3–7 pairs, greyish-green, ± remote, 4–30 mm long and 1.5–5 mm wide, mostly flattened, linear to narrowly elliptic, acute, with a mucro up to 2 mm long, both sides densely covered with short appressed or sometimes spreading hairs. Inflorescence dense, overtopping the leaves; flowering part 3–4 cm long and 1.5–3 cm in diameter, globose to ovate; peduncle 3–8.5 cm long, often longer than the leaves, densely villose, later on glabrescent. Bracts thickly membranaceous, at margins hyaline, yellowish, sometimes with purple tip, 8–15 mm long and 2.5–5 mm wide, ovate to oblong-elliptic, long or shortly acuminate, glabrous or rarely ciliate. Calyx whitish to creamy with purple nerves and teeth, sometimes the tube in upper part or wholly purple, 12–24 mm long, 4–6 mm wide at flowering time and 5–8 mm at fruiting time, at first tubular, then ovate-elliptically inflated, with 17–25 parallel nerves, densely covered with long appressed hairs becoming densely to sparsely villose; teeth 4–11 mm long. Corolla limb pink to red or light purple. Standard 16–27 mm long; limb 9–17 mm long and 5–8.5 mm wide in upper part and 5.5–9.5 mm wide at the base, ovate-panduriform, rounded at the apex or slightly retuse, minutely mucronulate, hastate-auriculate at base; claw 5–9 mm long, cuneate. Wings 15–23.5 mm long; limbs 6.5–12 mm long and 2.5–3 mm wide, narrowly oblong, sometimes slightly enlarged in upper part, obtuse or obliquely acute at tip; auricle 0.3–0.6 mm long; claw 9–12 mm long. Keel 14–20 mm long; limbs 5–6.5 mm long and 2.5–3.5 mm deep, obovate-triangular, with narrowly curved lower edge and ± concave upper edge, obtuse, minutely mucronulate; claw 9–15 mm long. Stamens at upper 4–5 mm free from each other. Fruit 7–8 mm long, 1.5–2 mm high and 3–4 mm wide. Seeds light to dark brown, 3.5–4.5 mm long, and 2.5–2.8 mm wide, elliptic-reniform, ± flattened, pitted.
Flowering and fruiting time: (V–)VI–VIII.
Ditribution: Iran. Map 9.

Specimens seen:

Iran. Prov. Tehran: Karaj, Shahdasht, Palangabad, 1250 m, 11.5.1974, *Dini & Bazargan 8377* (W) – Hezar Darreh, Tehran-Abali, 1600 m, 27.5.1972, *Dini & Arazm 15748* (W) – Sad-e Latyan, 1750 m and 1900 m, 7.5.1972, *Dini 15001, 15855* (W) – Road of Firuzkuh, Seyyedabad, 2500 m, 4.6.1972, *Dini & Arazm 15739* (W). – Prov. Markazi: In monte Raswend, V.1896, *Strauss* (B) – In dit. urb. Sultanabad, Schahzinde in montibus, V./VI. 1897, *Strauss* (B, BRNM, JE) – In m. Kuh-i-Sefidchane, *Strauss* 12.6.1904 (B, W), VII.1903 (B) – In m. Elwend-Gulpaigan, 30.5.1908, *Strauss* (B) – In m. Kuh. Gasawend, 1.7.1909, *Strauss* (B, W) – In m. Kuh-Besri, 4.6.1910, *Strauss* (B). – Prov.Hammadan: In montibus Karagan, V.1902, *Strauss* (B) – dito VII.1889, *Strauss* (JE) – Prov. Lorestan: Burudschird, V.1898, *Strauss* (B, JE) - Prov. Esfahan: S Khunsar, Kuh Sial, 2600 m, 17.5.1973, *Babakhanlu & Amin 15646* (W).

Together with *A. chehreganii* it forms an ± isolated group. Long standard and wing limbs, broad inflorescence and relatively shortly hairy calyx characterize the species.

See also the note under *A. chehreganii*.

20. ***Astragalus tabrizianus*** Fisch., Bull. Soc. Imp. Naturalistes Moscou 26(2): 445. 1853 ≡ *Tragacantha tabriziana* (Fisch.) Kuntze, Revis. Gen. 2: 948. 1891. Syntypes: ad Dshehan nameh, *Bode* (LE!); in promontoriis jugi Sahend, 22.6.1847, *Buhse*. **Lectotype** (PODLECH & SYTIN, here designated): [Aorbange] in promontoriis jugi Sahend, 22.6.1847, *Buhse* [*627*] (LE!; Iso: G-BOIS!, M!, P!)

= *A. cordatus* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11(16): 69. 1868 et l.c. 15(1): 114. 1869 ≡ *Tragacantha cordata* (Bunge) Kuntze, Revis. Gen. 2: 944. 1891. Holotype: inter Teheran et Tabris, [inter Aghkent et Mianeh], VI.1859, *Bunge & Bienert* (P!; Iso: G-BOIS!)

Fig. 5a

Plants 15–25 cm high. Hairs 0.1–3 mm, on calyx up to 4(–5) mm long, mostly thin. Stems prostrate to ascending, up to 12(–17) cm long, growing 0.5–4 cm per year, in first year 1–3 mm in diameter. Stipules chartaceous, yellowish, with 1–3 parallel nerves at free part, 8–15(–18) mm long, at a length of 4–8(–10) mm adnate to the petiole, otherwise 1.5–5 mm connate, ovate to lanceolate, acuminate, glabrous, younger ones sometimes sparsely appressed pilose, ciliate or not. Leaves 1–15 cm long; rachides dense, rigid, thick, straight, oblique to subhorizontal, rarely curved, densely to sparsely covered with appressed to semi-appresed hairs, or becoming glabrous; petiole 1/5–1/3 the length of the rachid; end-thorn 1/10–2 times as long as the uppermost leaflets; leaflets in (2–)3–9 pairs, remote, silvery to light green, complicate or rarely flattened, 6–22 mm long and 1.5–4 mm wide, linear to narrowly elliptic, acute, with a mucro up to 2 mm long, both sides densely sericeous. Inflorescence not higher than the leaves, ± dense, 4–8 cm long and 3–3.5 mm wide; peduncle 0.5–9 cm long, densely villose. Bracts chartaceous, yellowish, rarely red at tip, 8–20 mm long and 4–9 mm wide, very broadly to lanceolate-elliptic, long acuminate, densely appressed pilose, or at least hairy on midrib. Calyx whitish or creamy, purple at the teeth, at first tubular, later on ovate-elliptically inflated, 11–17 mm long and 4–10 mm wide, with 20–30 parallel nerves, densely appressed hairy becoming sparsely villose; teeth 5–8(–12) mm long. Corolla limb pink to dark purple. Standard 13–18 mm long; limb 7.5–12 mm long and 4–7 mm wide, oblong-panduriform, obtuse or rarely retuse at tip, minutely mucronulate, acutely hastate at base; claw 4–8 mm long, broadly cuneate. Wings 13–17 mm long; limbs 6–7 mm long and 2–2.5 mm wide, narrowly oblong, sometimes somewhat broader in upper third, obtuse; auricle 0.3–0.6 mm long; claw 7.5–10.5 mm long. Keel 11.5–15 mm long; limbs c. 5 mm long and 2–3 mm deep, obovate-triangular, with almost rectangular curved lower edge and straight or ± convex upper edge, obtuse, minutely mucronulate; auricle tiny; claw 7.5–10 mm long. Stamens at upper 3–5 mm free from each other. Fruit 7–9 mm long, c. 2 mm high and 2.5–4 mm wide. Seeds olive-green to dark brown, 3–4 mm long and 2–2.8 mm wide, elliptic, at first smooth becoming rugose.
Flowering and fruiting time: VI–VIII.
Distribution: NW and W Iran. Map 9.

Specimens seen:

Iran. Prov. W. Azarbaijan: Rezaieh, Ashk Island, 1300–1400 m, 20.6.1977, *Moussavi & Zargani 36814* (W) – Rezaiyeh, Ile de Kaboudan, 1300–1600 m, 4.6.1978, *Matine & Daneshpajouh 38379* (W) – dto., 18.6.1977, *Moussavi & Zargani 36806* (W) – Rezaiyeh lake, Espire island, 1330 m, 2.6.1974, *Wendelbo, et al.* (LE, W). – Prov. E Azarbaijan: 20 km S of Marand, forest near water, 1900 m, 28.6.1969, *Andersen & Petersen 76* (K, W) – Tabriz to Marand, 18 km S Marand, 1500 m, 27.7.1971, *Termeh 40937* (W) – In monte Mishab Dagh prope Yam, 1800–2400 m, 29.7.1971, *Termeh 43913* (W) – ad Dshehan nameh, *Bode* (LE) –

in promontoriis jugi Sahend, 22.6.1847, *Buhse*.(G-BOIS, LE, M, P) – Bostan-abad, Atmish-alti, Damaneh-ye Sahand, 2620 m, 3.8.1984, *Terneh & Moussavi 41388* (W). – inter Teheran et Tabris, [inter Aghkent et Mianeh], VI.1859, *Bunge & Bienert* (G-BOIS, P) – Prov. Kermanshah: volcanic hillside at Dinard, 40 km from Bistoon, 80 km NE of Kermanshah, 26.6.1965, *Ledingham, Bonvan et al. 4212* (W) – Dry hillside of volcanic ash, 3 km of Harsin, 60 km E Kermanshah, 26.6.1965, *Ledingham, Zohary, Bonvan et al. 4201* (W) – rocky volcanic mountain at Dinard, 80 km NE Kermanshah, 26.6.1965, *Ledingham, Bonvan, et al. 4213* (W) – Touiserkan to Kangavar, 1650–1750 m, 11.6.1959, *Pabot 12489* (W) – 5 km on the road from Dehlagh to Kangavar, between Sahneh and Songhor, 1710 m, 6.7.1994, *Chehregani & Zarre 17813* (MSB, TARI, TUH) – Tagh-e Bostan to Parrow mts., 10 km on the sandy road after military station, 1500–1600 m, 6.7.1994, *Chehregani & Zarre 17821* (MSB, TARI, TUH).

A. tabrizianus is closely related to *A. lagopoides*. It has sometimes also long acuminate bracts, which is the common feature of *A. lagopoides*. In contrast to *A. lagopoides*, *A. tabrizianus* has always inflorescences which are shorter than or as long as the leaves. Short inflorescences can also rarely be found in *A. lagopides*, then, however, they are spherical and short (2.5 cm in diameter). Moreover, the lower bracts of *A. tabrizianus* fall away easily at fruiting time, whereas they are persistent in *A. lagopoides*. See also the notes under *A. hirticalyx*, *A. lagopoides*, *A. hymenostegis* and *A. velenowskyi*.

The specimens from Prov. Kermanshah are different from typical *A. tabrizianus* in some aspects. For example they have leaflets strongly complicate and caducous bracts and flowers. Because of intermediate forms and no exact limitation we refrain from assigning any formal rank to them. This form was attributed to *A. laguriformis* by MAASSOUMI (1995).

21. ***Astragalus uraniolimneus*** Boiss., Fl. Or. 2: 380. 1872 ≡ *Tragacantha uraniolimnea* (Boiss.) Kuntze, Revis. gen. 2: 949. 1891. **Lectotype** (designated here): Armenia Rossia, mt. Alages et ad lacum Gocktschai, *Seidlitz* (G-BOIS!; Iso: G-BOIS!).
= *A. woronowii* Bornm., Vestn. Tiflissk. Bot. Sada 26: 1. 1912. Holotype: Prov. Batum, distr. Artvin, in monte Ekuter, 2200 m, 29.7.1911, *Woronow 5946* (B!; Iso: LE!).

Plants 10–20 cm high. Hairs 0.1–1.5 mm, on peduncle up to 3 mm and on calyx up to 4 mm long, crispate or straight. Stems ascending, up to 15 cm long, growing 1–4 cm per year, in first year 1–3 mm in diameter. Stipules thinly membranaceous, hyaline at free portion, yellowish white, with 1–3 parallel nerves at free portion, 8–16 mm long, at a length of 3–9 mm adnate to the petiole, otherwise 0.5–2 mm connate, triangular-acuminate, glabrous, ciliate. Leaves 0.7–4.5 cm long; rachides dense, ± thick, rigid, mostly straight, obliquely erect to subhorizontal, lower ones sometimes deflexed, densely or sparsely spreading hairy; petiole 1/3–1/2 the length of the rachid; end-thorn 1/5–1/2 the length of the uppermost leaflets; leaflets in 4–6 pairs, dense, grey-green, slightly complicate to flattened, 3–14 mm long and 1–2.5 mm wide, linear to narrowly oblong, acute, with a mucro of 0.2–1 mm long, both sides densely covered with appressed to subappressed hairs. Inflorescence overtopping or rarely as long as the leaves; flowering part dense, 3–5 cm long and 2–3 cm in diameter, short cylindrical or rarely globose; peduncle shorter or as long as the leaves, 2–5 cm long, densely to sparsely villose. Bracts thinly membranaceous, hyaline at margins, yellowish, mostly purple at tip, 8–12 cm long and 2.5–4 mm wide, ovate to lanceolate-elliptic, shortly acuminate, wholly glabrous or sparsely pilose at the apex and midrib, ciliate. Calyx creamy, red to purple in upper part or rarely allover, at first tubular, soon

globose-elliptically inflated, 12–16 mm long and 4–7 mm wide, with 12–17 parallel nerves, densely covered with appressed to subappressed long hairs becoming sparsely villose; teeth 5–7 mm long. Corolla limb pink or mauve to red. Standard 17–25 mm long; limb 12–17 mm long and 5–8 mm wide, oblong-panduriform, retuse at tip, hastate-angulate at the base; claw 4–5 mm long, broadly cuneate. Wings 14–22 mm long; limbs 6–8 mm long and 2–2.5 mm wide, narrowly oblong, obtuse; auricle 0.3–0.6 mm long; claw 7.5–9.5 mm long. Keel 12–17 mm long; limb 5–6 mm long and 2.5–3 mm deep, triangular-obovate, obtuse, minutely mucronulate; claw 7–9.5 mm long. Stamens at upper 3–4 mm free from each other. Fruit 4–6 mm long, 1.5–2 mm high and 2.5–3 mm wide. Seeds olive green to dark brown, 2.5–3.5 mm long and 2–2.5 mm wide, broadly elliptic to almost rounded, pitted.
Flowering and fruiting time: VI–VIII.
Distribution: Azerbaidzhan, Armenia, NW Iran. Map 9.

Specimens seen:

Azerbaidzhan. Prov. et distr. Gandzh, in mte. Karadagh, 12.7.1928, *Doluchanov* (LE) – ad lacum Gokza inter Semenocoka et Elenowka, 20.6.1901, *Fomin* (W) .

Armenia. Prov. Batum: distr. Artvin, in monte Ekuter, 2200 m, 29.7.1911, *Woronow 5946* (B, LE) – Armenia Rossia, mt. Alages et ad lacum Gocktschai, *Seidlitz* (G-BOIS) – Distr. Novo-Bajazet, in montibus supra pagum Shish-kaja, 7–10000 ft, 19.7.1928, *Grossheim* (LE) – Prope Shish-kaja, in faucibus, 9000 ft, 20.7.1928, *Shelkovnikov & Kara-Murza* (LE) – Novo-Bajazet, in jugo Shakh-dagh, prope p. Sultan-Ali-Kishlaki, 29.7.1928, *Zedelmejer & Gejdeman* (LE) – Distr. Novo-Bajazet, in jugo Artakhanoz, prope pagum Tzamakapert, 6800–8000 ft, 28.6.1928, *Zedelmeyer & Shelkovnikov* (LE) – Sevan: circa lac. Gokca, rip Günei, in declivibus prope Tochludja, 7600 ft, *Shelkovnikov & Kara-Murza* (LE) – Prov. Zangezur, circa p. Gedjalan fauc. Jaglu-dara, 30.7.1929, *Shelkovnikov & Kara-Murza* (LE) – Distr. Migri, inter Ketchmas et p. Tashtyn, in declivis meridionalis siccis, 2500 m, 20.8.1932, *Karjagin* (LE, ZT) – Promontoria Pambacensi supra lacum Sevan, 29.7.1939, *A.Fedorov* (LE) – Kaputdzhukh, Schabnoi, Zapadnii Verschini, 11.8.1950, *Gabrieshi* (W) – Montes Pambakski khrebet, in vicinitate oppidi Sevan, 1900–2200 m, 17.7.1975, *Vasak* (B, W) – Distr. Abrakunis ad limites Armeniae, 14.8.1940, *Karjagin* (LE) – P. Gedjalan fauc. Jaglu-dara, 30.7.1929, *Shelkovnikov & Kara-Murza* (LE) – In monte Sojuch supra Ordubad, 6–8000 ft, 27.5.1928, *Grossheim* (LE) – In jugo Zangezur, in monte Salvatry, 3000 m, 15.8.1927, *Gavrilov & Doluchanov* (LE).

Iran. Prov. W Azarbaijan: Khoi, Ghotour, 5.7.1955, *Sharif 2602* (W) – Kuh Kani Ziarat, N Habashi Bala, prope Qotur, 2300–3000 m, 18.7.1974, *Rechinger & Renz 49641* (W). – Prov. E Azarbaijan: Kalibar, Nabidjan, Kouhha-ye Doghroun, 2720 m, 26.6.1978, *Termeh et al. 38955* (W) – Ahar, Kuh Kalibar, 4.8.1968, *Termeh 133221* (W).

A. uraniolimneus is closely related to *A. hymenocystis* and *A. lagopodioides*. The dense inflorescence make it easily recognizeable from the remotely flowered *A. lagopodioides*. The inflorescence of *A. uraniolimneus* is mostly shortly cylindrical, but sometimes it may be globose. Specimens which show this character can be confused with *A. hymenocystis*. However, the latter possesses flexible and mostly curved rachides, in contrast to *A. uraniolimneus* with rigid and mostly straight ones.

The specimens cited as A. *uraniolimneus* by MAASSOUMI (1995) belong to A. *hymenocystis* subsp. *confiniorum*.

Short pedunculate forms of *A. uraniolimneus* have a similar habit as *A. hirticalyx*. However, in difference to *A. hirticalyx*, they have hyaline stipules and short standards.

22. *Astragalus velenovskyi* Nábelek, Spisy Prir. Fak. Masarykovy Univ. 35: 82. 1923. **Typus** (**HT**: sec. Fl. Turkey, BRNU, sed verosim. SAV): Kurdistania Turcia, distr. Hakkari, inter rivum Serkones et pag. Howaras, SE ab urbe Wan, 2.9.1910, *Nábelek 3108* (BRNU? SAV?).

Figures: NÁBELEK, Spisy Prir. Fak. Masarykovy Univ. 35: tab. 6, nr. 1. 1923.
Fig. 5c

Plants 20–30 cm high. Hairs 0.1–2 mm, on calyx up to 4 mm long, mostly thin. Stems ascending, up to 18 cm long, growing 0.5–5 cm per year, in first year 1–3 mm in diameter. Stipules chartaceous, not hyaline, yellowish, with 1–3 parallel nerves at free portion, 14–17 mm long, at a length of 8–11 mm adnate to the petiole, otherwise 2–4 mm connate, from a narrowly triangular base lanceolate-acuminate, younger ones densely appressed pilose, becoming glabrous, ciliate. Leaves 1.5–8 cm long; rachides dense, rigid, thick, older ones mostly broken, ± straight, obliquely erect to subhorizontal, densely shortly appressed hairy; petiole 1/4–1/2 the length of the rachid; end-thorn 1/6–1/2 the length of the uppermost leaflets; leaflets in 3–7 pairs, ± remote, greyish or silvery-green, 7–18 mm long and 1.5–3 mm wide, linear to narrowly oblong, complicate, acute, with a mucro up to 1.5 mm long, both sides densely to sparsely sericeous. Inflorescence shorter or as high, rarely somewhat higher than the leaves; flowering part ± dense, cylindrical or rarely ovate, 5–9 cm long and c. 2.5 cm wide; peduncle 0.5–2 cm long, shorter than the leaves, densely appressed pilose. Bracts chartaceous, not hyaline, yellowish, (8–)10–14 mm long and 4.5–9 mm wide, broadly ovate to lanceolate-elliptic, long acuminate, densely appressed hairy. Calyx whitish or creamy, at first tubular, becoming elliptically inflated, 13–15 mm long and 3.5–6 mm wide, with 13–23 parallel nerves, densely appressed villose; teeth 6–7 mm long. Corolla yellowish. Standard 14–17 mm long; limb c. 10 mm long and 5–6.5 mm wide, elliptic, minutely mucronulate at tip or obtuse, hastate at base; claw 4–6 mm long, broadly cuneate. Wings 13–16 mm long; limbs 6–7 mm long and 2–2.5 mm wide, narrowly oblong, obtuse; auricle 0.2–0.4 mm long; claw 7.5–9 mm long. Keel 12–15 mm long; limbs c. 5 mm long and 2.5 mm deep, obovate-triangular, with almost rectangular curved lower edge and straight or ± convex upper edge, obtuse or minutely mucronulate; claw 7–10 mm long. Stamens at upper 2.5–3.5 mm free from each other. Fruit and seeds unknown.
Distribution: E Turkey and NW Iran. Map 8.

Specimens seen:

Turkey. Prov. Agri: Agri to Hasiran, W Eleskirt, Weg nach Hayrangöl, 2650 m, 17.8.1987, *Engel 140* (MSB) – Aufstieg zum Ararat südseitig Dogubayazit, Ganikor, Ibrahimharo, Camp III, Araratgipfelzone, 3700 m, 13.–17.8.1969, *Albertshofer & Schauer* (M). – Prov. Van: Ercis to Delicay, weiter nach Pay Köyü, 2200 m, 14.8.1987, *Engel 131* (MSB) – Zab gorge S of Baskakle, 2.8.1954, *Davis & Polunin 23796* (PRC).
Iran. Prov. E Azarbaijan: 5 km E of Kandujan (= 33 km E of Khosroshah), on Sahand mountain-massif, semi-desert, 2900 m, 19.7.1964, *Grant 18, 283* (W).

A. velenowskyi is closely related to *A. lagopoides* and *A. tabrizianus*. It is different from *A. lagopoides* in having shorter peduncle, which make the whole inflorescence to be shorter than or maximally as long as the leaves and the bracts, which are scarcely as long as but mostly shorter than the calyx. It differs from *A. tabrizianus* in having yellow corolla and calyx teeth.

Doubtful species

A. demonstratus Maassoumi, Iran. J. Bot. 6(2): 204. 1995. Holotype: Zanjan, Mahneshan, ca. 10 km from Mahneshan to Pari, 2000 m, 24.5.1987, *Maassoumi et al. 64804* (TARI)

This newly described species has been collected in a region of Iran, of which we have only few material. Unfortunately the original description is incompelete, and the given sizes of flowers seem to be unrealistic. Such a wrong floral size has been cited also for *A. pedicularifomis*: The standard length were cited 18-24 mm, but we have analyzed more material as Maassoumi and couldn't find any standard longer as 18 mm. If the same is true for *A. demonstratus* too, and the real length of the standard is 18 mm (in the description ca. 23 mm), *A. demonstratus* would be a synonyme of *A. tabrizianus*. Howevere for final statement the study of the holotype is necessary.

Conclusion

New combination: Sect. *Hymenocoleus* Bunge to sect. *Hymenostegis* subsect. *Hymenocoleus*.

Transfers: *A. leucargyreus* Bornm. from sect. *Hymenostegis* to sect. *Acidodes* (= *A. stenolepis*). *A. mishoensis* Turill from sect. *Rhacophorus* (genus *Astracantha*) to sect. *Hymenostegis* (= *A. hirticalyx*).

Newly described Taxa: *Astraglus chehreganii* Zarre & Podlech. *Astragalus hymenocystis* Fisch. & C.A.Mey. subsp. *confiniorum* Zarre & Podlech.

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Shahin ZARRE M., Prof. Dr. Dietrich PODLECH, Institut für Systematische Botanik der Universität München, Menzinger Straße 67, D-80638 München, Deutschland.

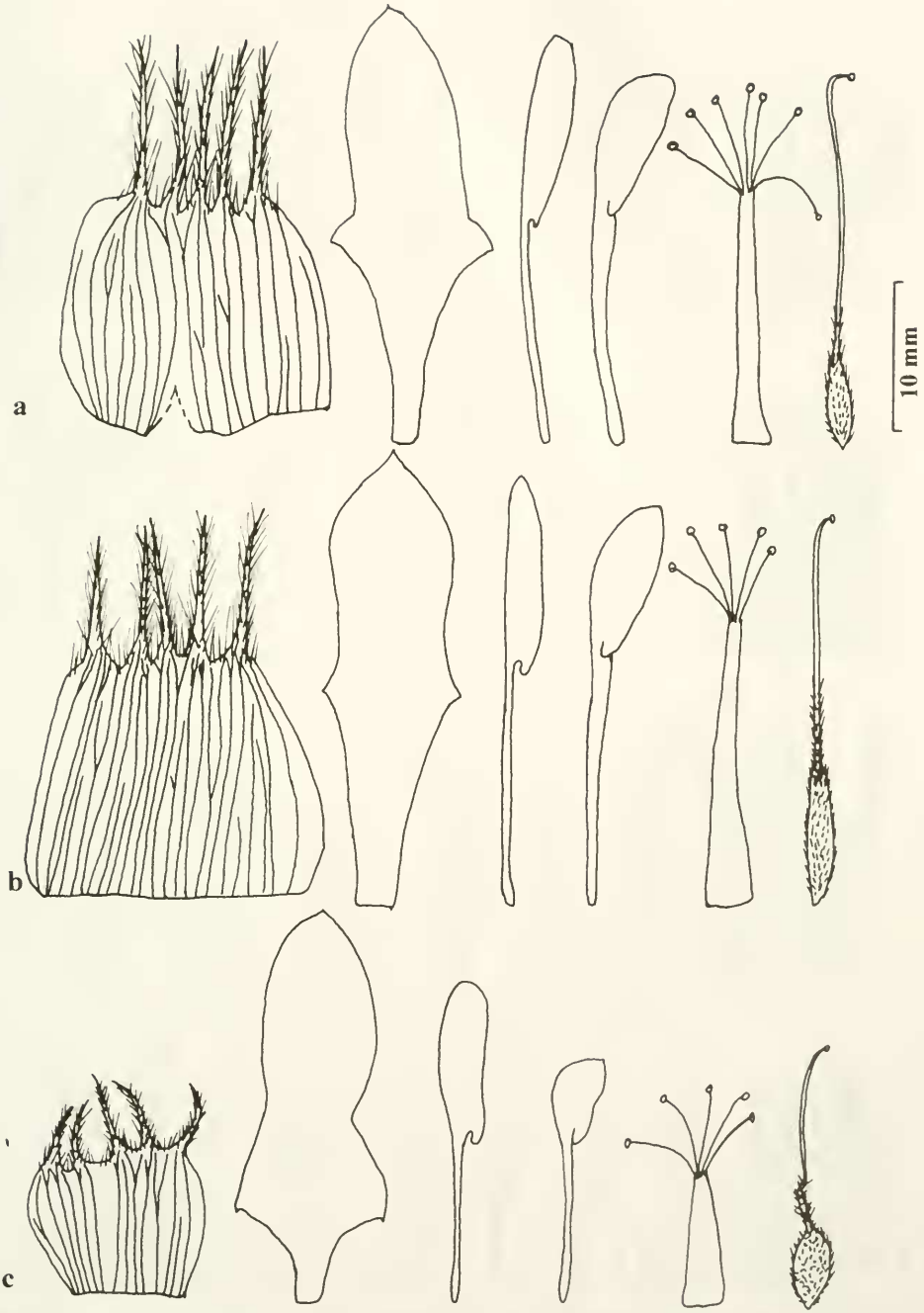


Fig. 1 a. *A. glumaceous*: *Rioux & Golvan 312* (W); b. *A. kohrudicus*: *Foroughi et al. 12468* (W); c. *A. strausii*: *Dini & Arazm 15748* (W).

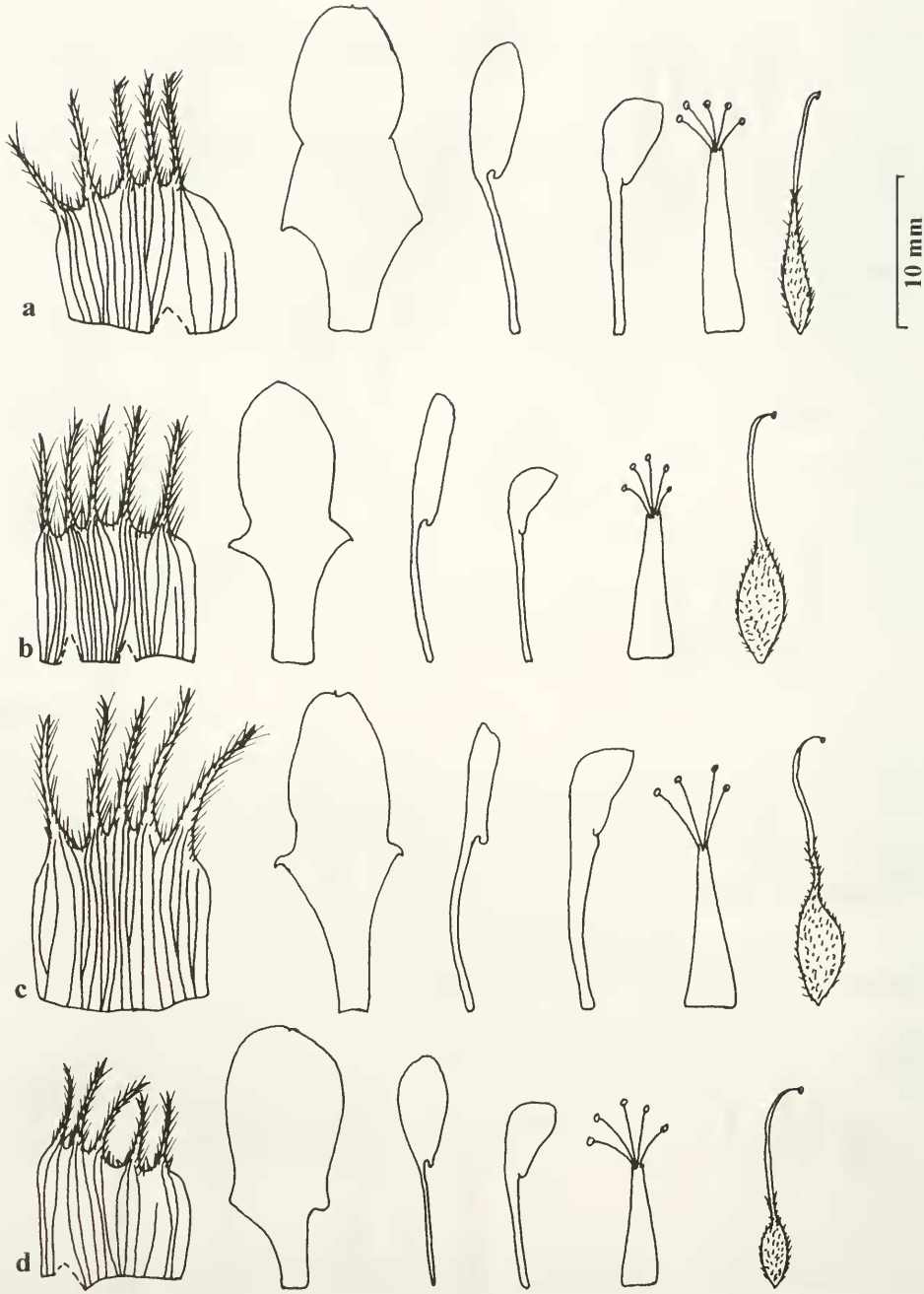


Fig. 2 a. *A. chehreganii*: *Rechinger 41877* (W); b. *A. nervistipulus*: *Rechinger 42914* (W); c. *A. sciureus*: *J. & A. Bornmüller 6879* (B); d. *A. rubrostriatus*: *Lamond & Iranshahr 40909* (W).

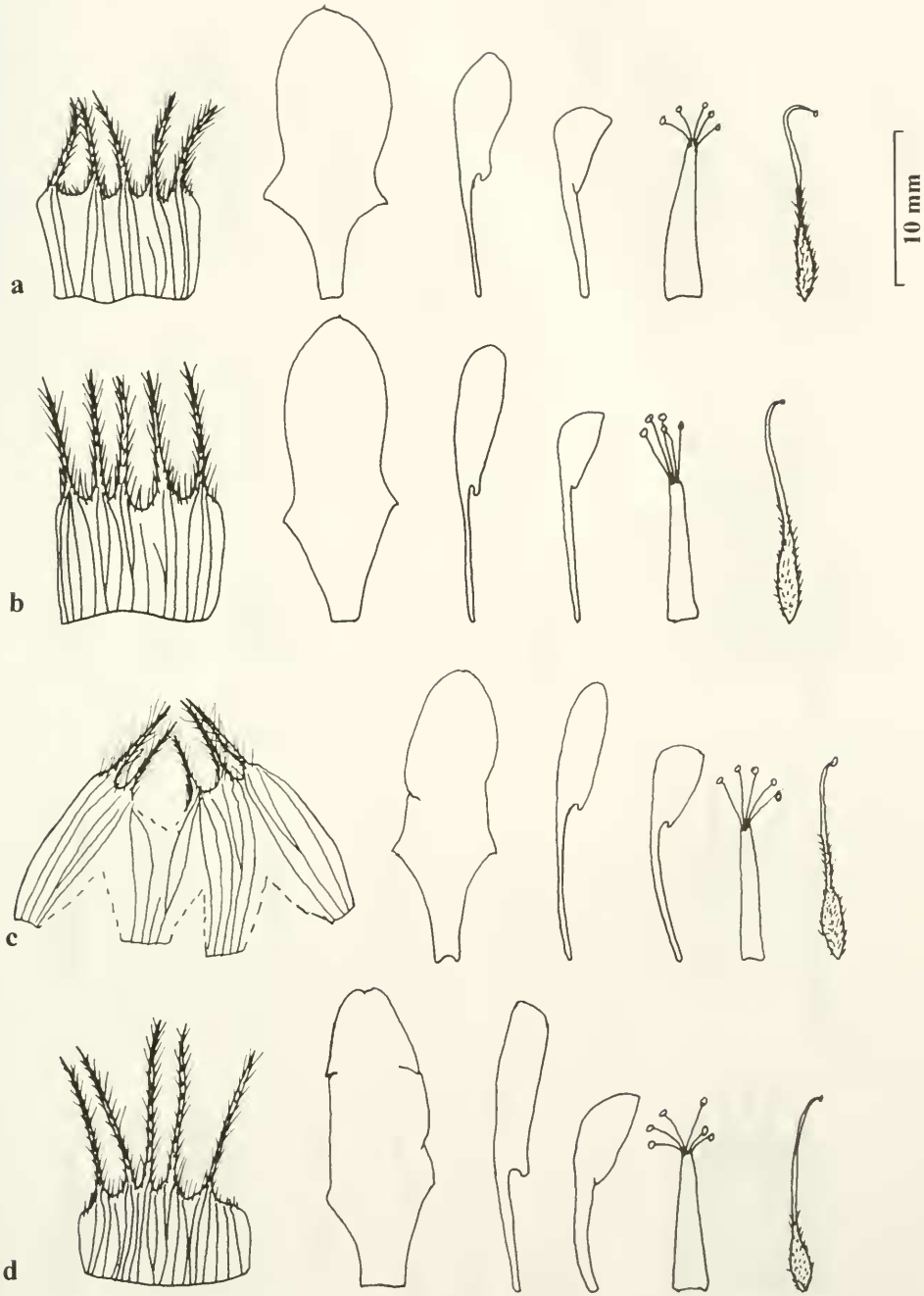


Fig. 3 a. *A. paralurges*: *Termeh 40928* (W); b. *A. lagopodioides Rix et al. 728* (M); c. *A. hymenocystis* subsp. *hymenocystis*: *Termeh 40999* (W); d. *A. hymenocystis* subsp. *confiniorum*: *W. Rechinger & Renz 48846a* (W)

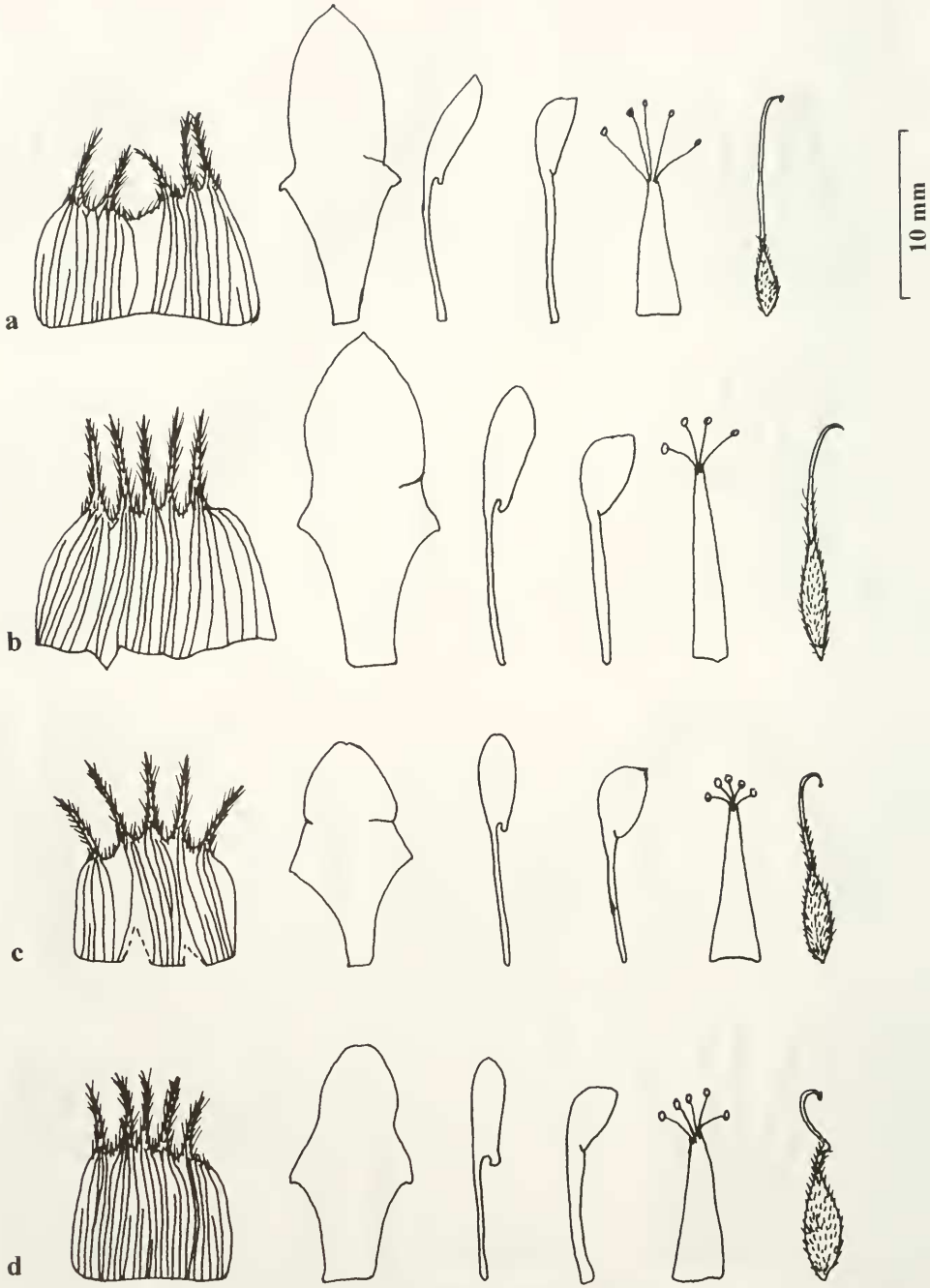


Fig. 4 a. *A. chrysostachys*: *Rechinger 40722* (W); b. *A. recognitus*: *Moussavi et al. 41074* (W); c. *A. lagopoides*: *Albertshofer* (MSB); d. *A. hymenostegis*: *Renz* (W).

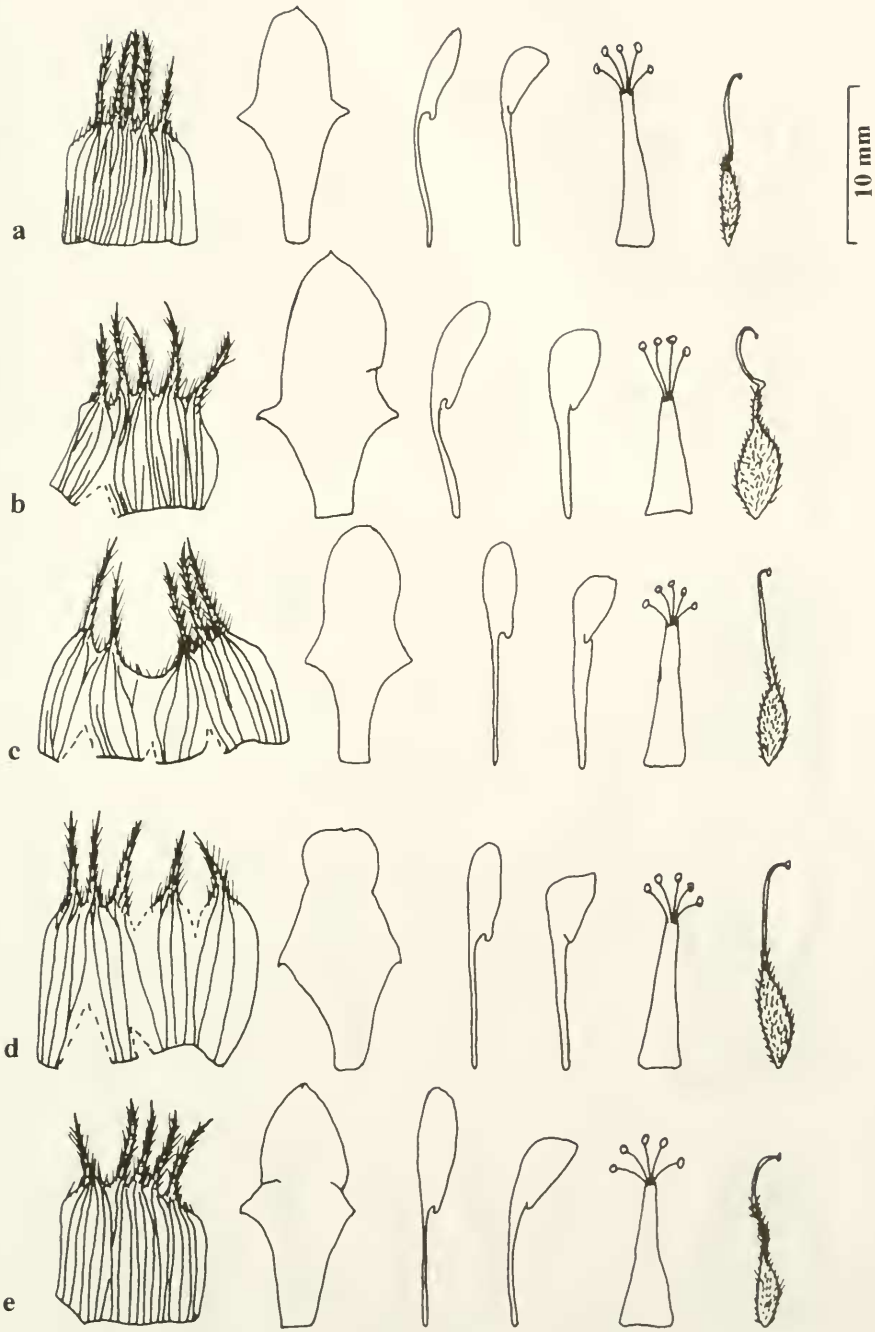


Fig. 5 a. *A. tabrizianus*: *Andersen & Petersen 76* (W); b. *A. pedicularifomis*: *Alava 14269* (TUR); c. *A. velenovskyi*: *Davis & Polunin D23796* (PRC); d. *A. laguriformis*: *Bornmüller 1194* (W); e. *A. hirticalyx*: *Brown 2116* (E).

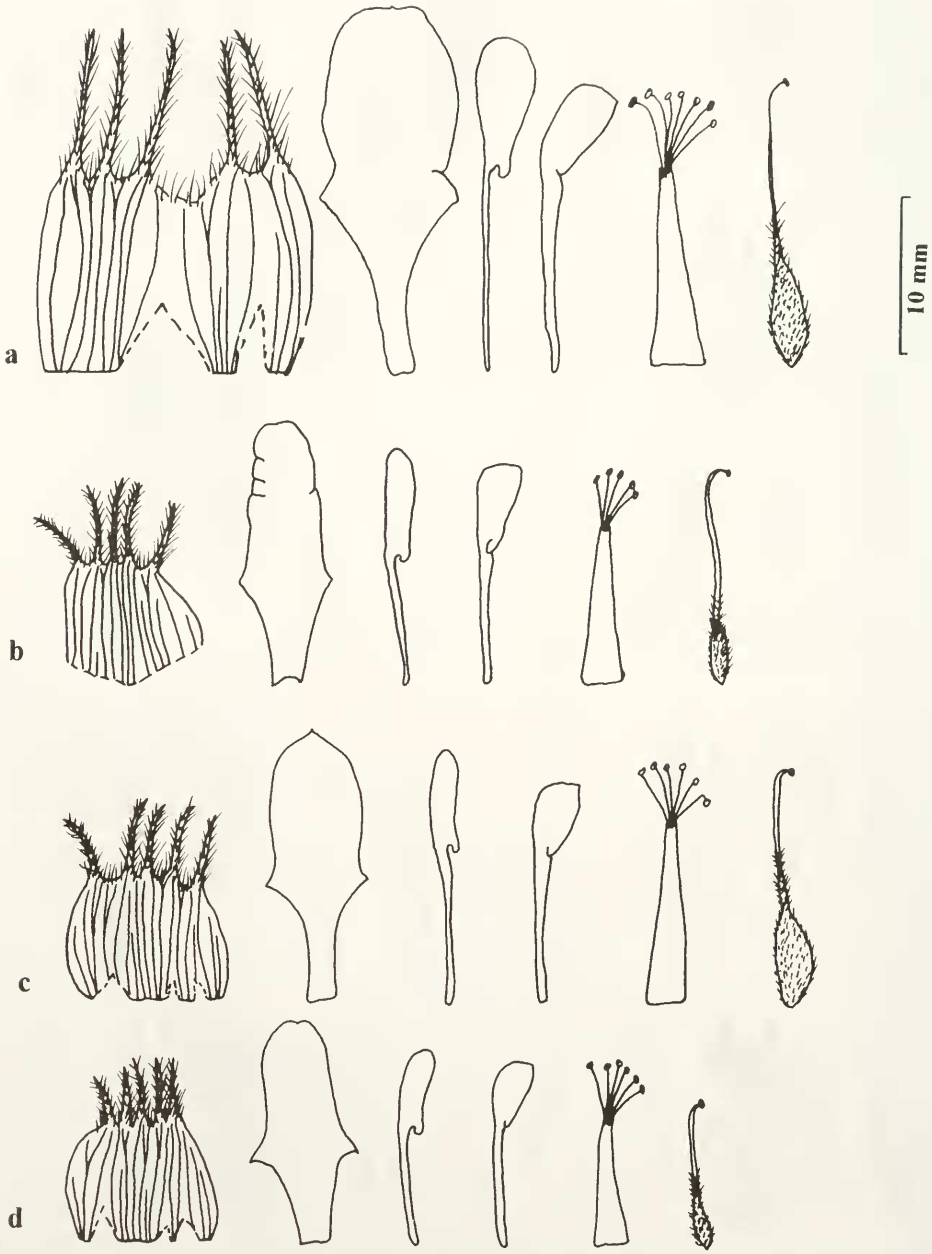
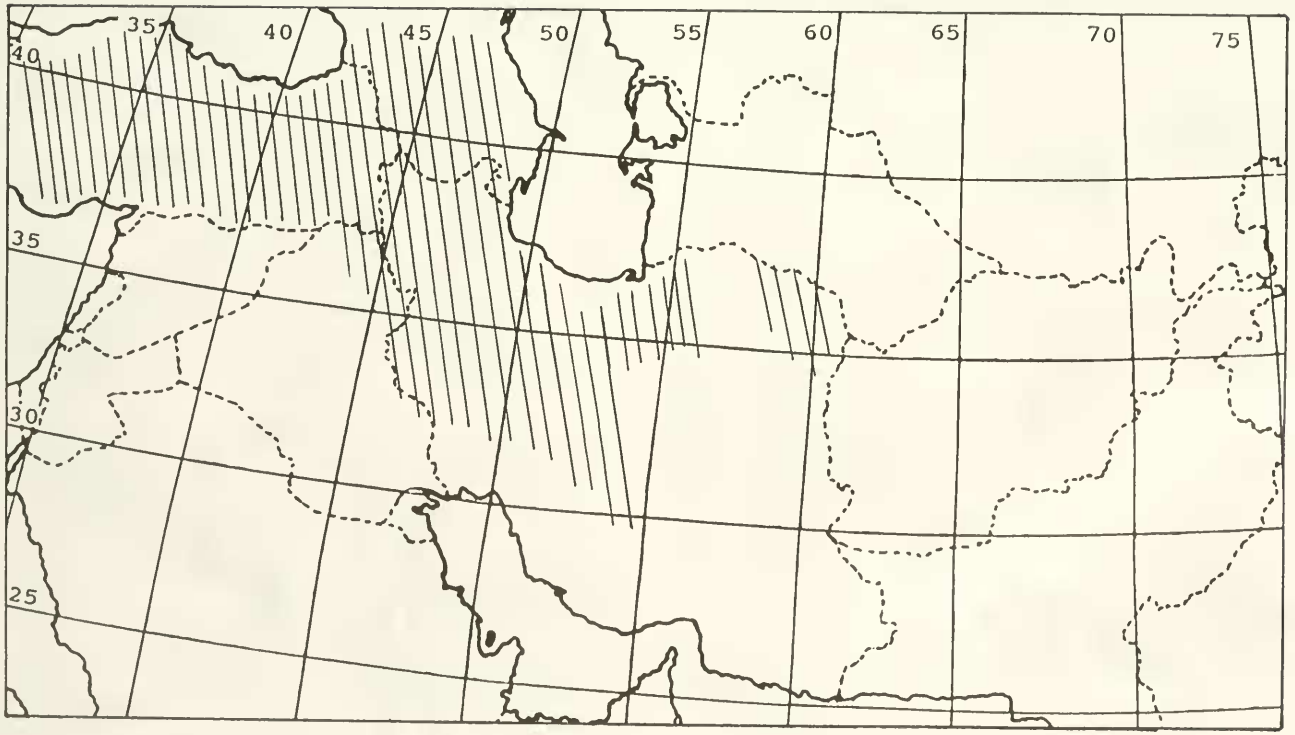
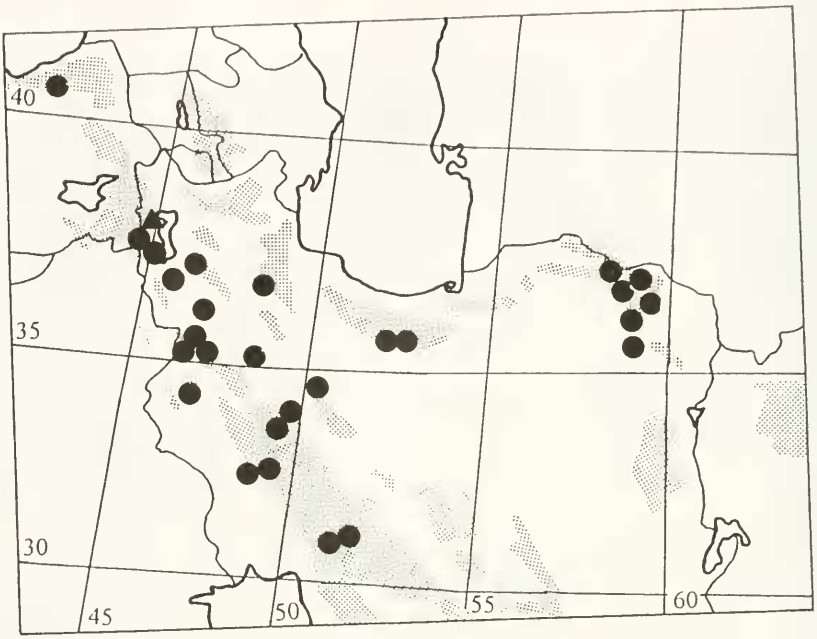


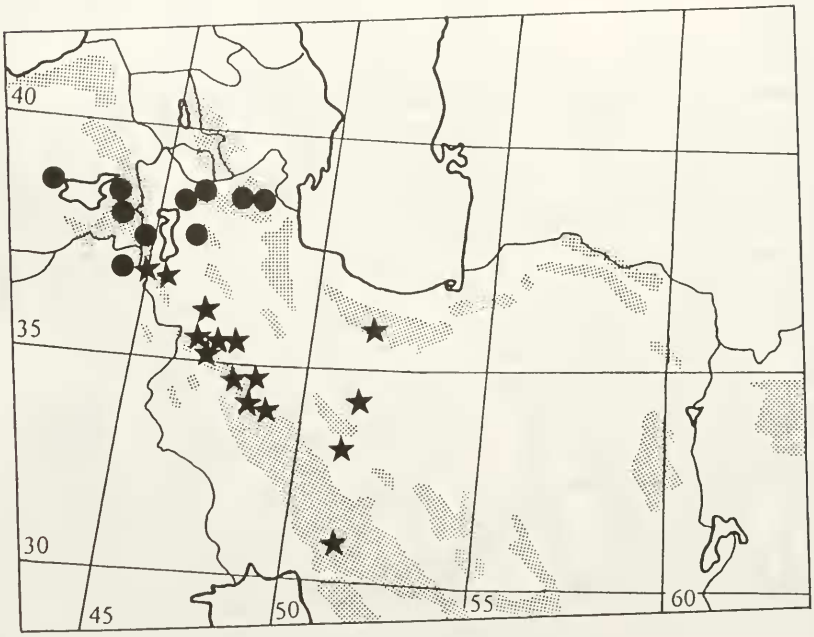
Fig. 6. *A. persicus*: a. *Gauba 543* (B); b. *Sojak 7763* (W); c. *Dini & Arazm 15707* (W); d. *Wendelbo & Assadi 13423* (W).



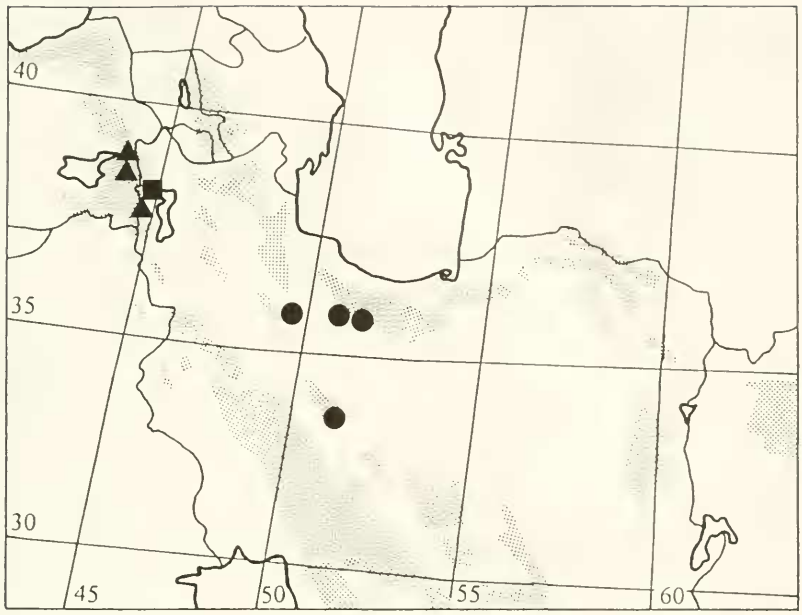
Map 1. Geographical distribution of the sect. *Hymenostegis*.



Map 2. ▲ *A. chehreganii*; ● *A. chrysostachys*.

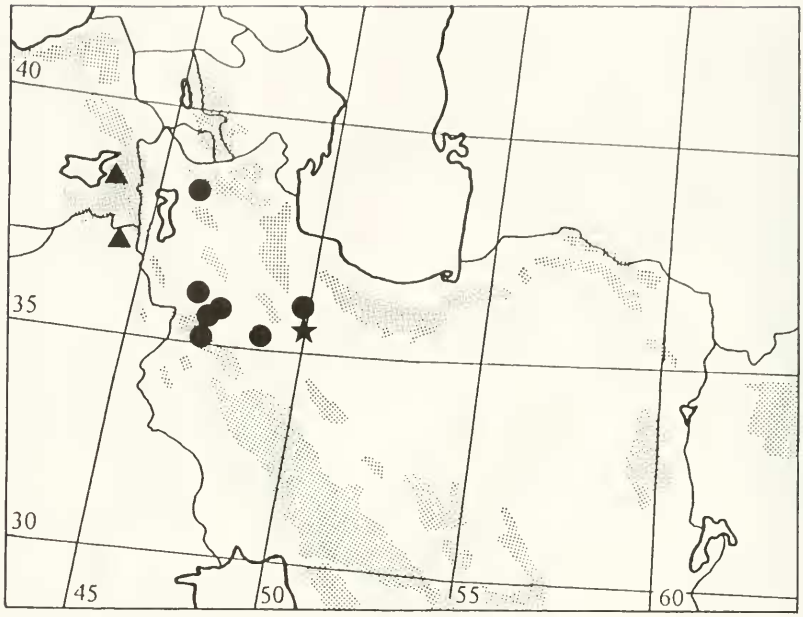


Map 3. ★ *A. glumaceous*; ● *A. hirticalyx*.

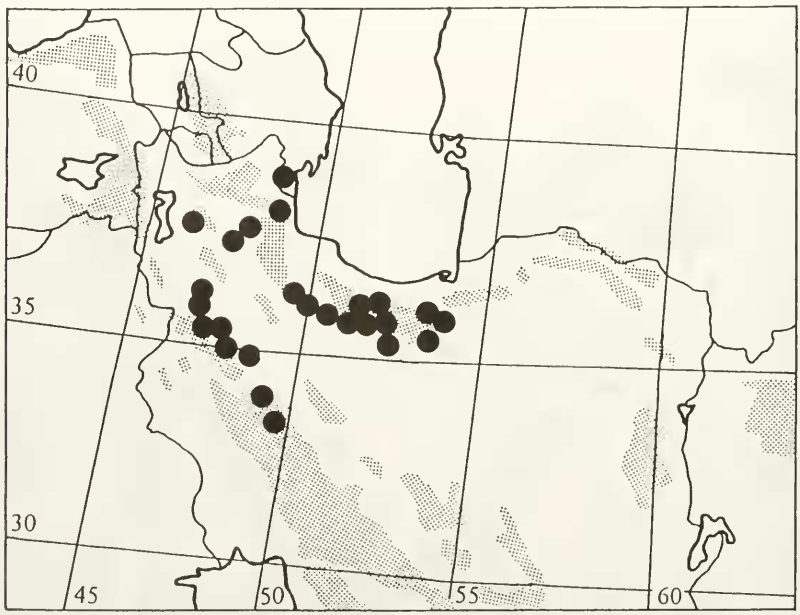


Map 4. ■ *A. hymenocystis* subsp. *hymenocystis*;
▲ *A. hymenocystis* subsp. *confiniorum*;
● *A. kohrudicus*.

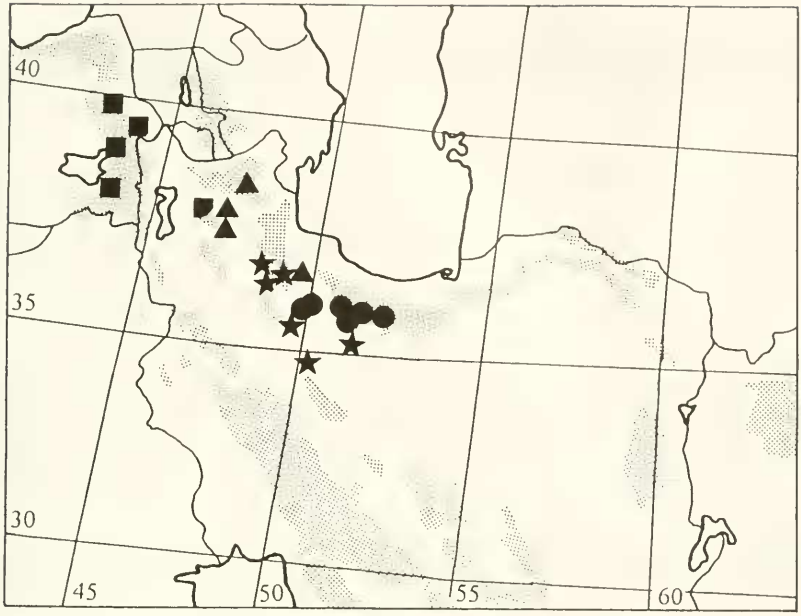
Map 5. ★ *A. hymenostegis*; ● *A. lagopodioides*; ▲ *A. nervistipulus*.



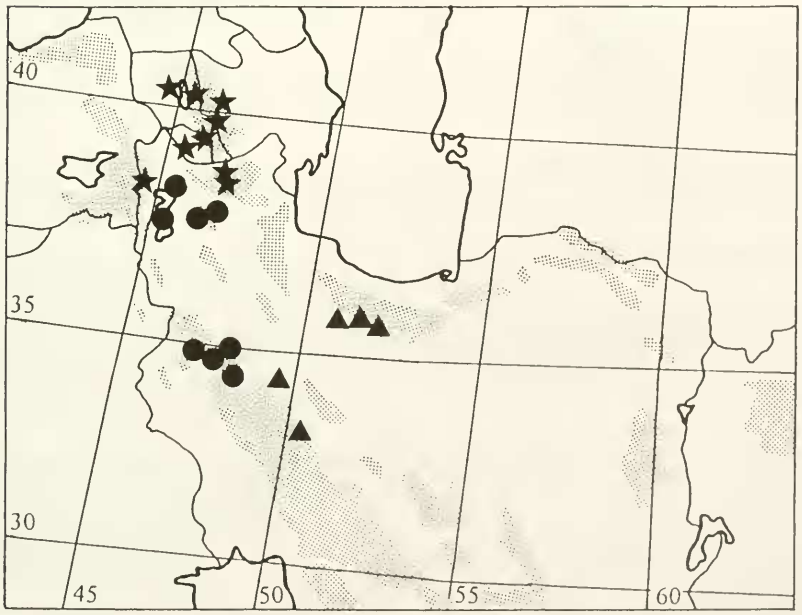
Map 6. ▲ *A. laguriformis*; ● *A. paralurges*; ★ *A. pedicilariformis*.



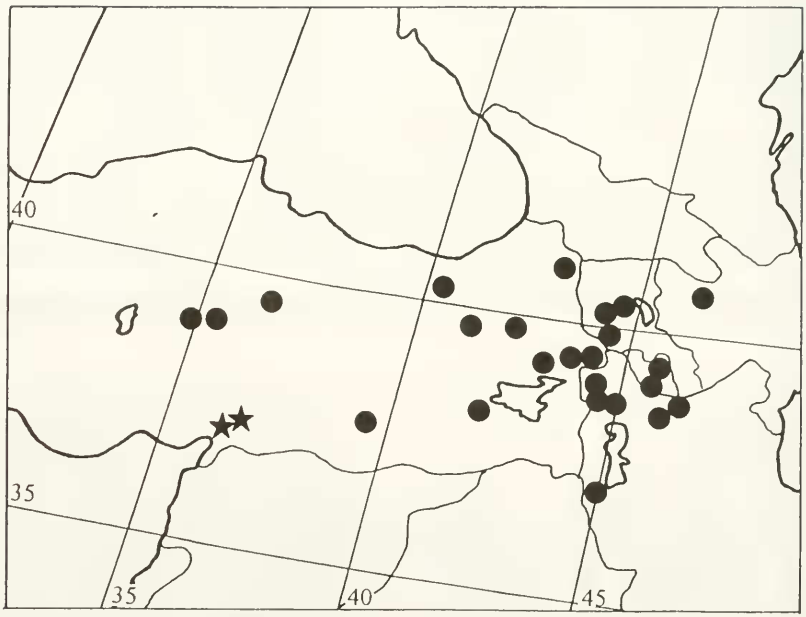
Map 7. ● *A. persicus*



Map 8. ▲ *A. recognitus*; ★ *A. rubrostriatus*; ● *A. sciureus*; ■ *A. velenovskyi*.



Map 9. ▲ *A. straussii*; ● *A. tabrizianus*; ★ *A. uraniolimneus*.



Map 10. ● *A. lagopodioides*; ★ *A. vaginans*.